Data science and statistical learning

ECTS credits
4 credits

In brief

> **Course langage:** French

Presentation

Prerequisites

Common core course of mathematics and signal processing of the first year of the École Centrale Méditerranée.

Learning objectives

Acquire the essential knowledge and know-how on data processing and learning methods for engineering sciences (applied physics, quality, consulting, risk management, complex systems engineering, logistics, etc.). A wide range of methods is presented with particular attention paid to their basis, implementation and limitations. These methods are illustrated by examples from various fields of application.

Description of the programme

* Data and uncertainty modeling,
* Estimation and learning techniques,
* Decision techniques (probabilistic, Bayesian, artificial neural networks),
* Correlated models (Markov analysis and techniques),
* Large deviations and rare events,
* Unsupervised learning and non-parametric estimation.

Generic central skills and knowledge targeted in the discipline

* Know how to define, implement and characterize different data processing systems for many fields of activity,

Data science and statistical learning

* Master the fundamentals of data analysis from industrial and physical systems or for project management in the broadest sense,
* Acquire critical expertise on the choice and limitations of data processing and learning methods,
* Understand the essential factors involved in complex systems.

How knowledge is tested

* Written exam CC1 : 50%
* Reports CC2 : 50%

Bibliography

* Ph. Réfrégier « Noise theory and application to physics » - Springer 2003.
* G. Saporta « Probabilité Analyse des données et statistique » - Editions Technip 1990.
* P.H. Garthwaite, I.T. Jolliffe and B. Jones « Statistical Inference » - Prentice Hall 1995.
* T.M. Cover and J.A. Thomas « Elements of information theory» - Wiley 2006.
* A. Ruegg « Processus stochastiques - Avec applications aux phénomènes d'attente et de fiabilité » - Presses Polytechniques et universitaires romandes 1989.

Teaching team

* G. Berardi
* J. Fade
* F. Galland
* Ph. Réfrégier

Sustainable Development Goal

Quality education

Total des heures		100h
CM	Master class	44h
TD	Directed work	12h
TP	Practical work	18h
PJ		20h
AU		6h

Useful info

Name responsible for EU

Lead Instructor

Julien Fade

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