Data and Decision Sciences @ Supaero

Program heads
Emmanuel Rachelson
Carlos Aguilar

50 trainers, experts from academia or major companies

Selective access
50 students

Supaero curriculum

1st & 2nd year	Gap year	3rd year
Core eng. courses	Professional experience	Data and Decision Sciences program
Elective courses : - Markov chains - Applied optimization - Intro to Big Data ...		Internship

Syllabus

Data Mining & Machine Learning
Advanced Statistics – Supervized, Unsupervized, Reinforcement Learning

Foundations in Decision Making
Decision Theory – Statistics – Optimization

Tools of Big Data
Databases – GPGPU – Could – Spark

Digital Economy and Data Uses
Business models – Privacy – Dataviz

Hackathon
3 days challenge – real-life data
Industrial partners
2016 edition on image analysis with IRT – Saint Exupéry
Link to 2016 edition press release

Internships
Dassault, Airbus, Sopra Steria, Air France, Bloomberg, Thales, start-ups, international research institutes...

Detailed syllabus

Foundations in Decision Making
60 hours of classes on:
- Decision Theory (multi-criteria, multi-sources, collective decision making, uncertainty modeling)
- Statistics (descriptive, exploratory, inference)
- Combinatorial Optimization (Complexity analysis, Constraint Programming, Graph-based Optimization – prerequisites: Mixed Integer Linear Programming, Non-linear Programming)
- Stochastic Optimization methods

Data Mining & Machine Learning
75 hours of classes on:
- Advanced statistics (statistical modeling, multivariate statistics)
- Unsupervized and Supervized Learning Algorithms (k-means clustering, Hierarchical clustering, Neural networks, Deep Learning, Naives Bayes classification, Gaussian Processes, Support Vector Machines, kernel methods, Boosting, Bagging, Random Forests, Statistical Learning Theory)
- Reinforcement Learning and Markov Decision Processes (model based and model-free, online, offline, Monte-Carlo tree search, Deep RL)

Tools of Big Data
45 hours of classes on:
- Databases (theory and practice)
- Functional Programming
- Practice of Python (C and Java are taught in the core courses in 1st and 2nd year)
- Spark ecosystem
- GPGPU computing
- Cloud computing

Digital Economy and Data Uses
30 hours of classes on:
- Business models in the digital economy
- Data security and privacy issues
- Dataviz and data storytelling

Hackathon
Counts as a 30 hour class.
Autonomy and agility on a real-world challenge in Data Science with industrial validation.

Seminars
All year long, by academics and professional experts.

Internship
6 months, with academic validation.

In parallel

Supaero 3rd year: choice of an independent applicative domain of study (aircraft, space systems, embedded systems, mathematical modeling, energy, transport, environment, etc.).

Master of Science in Operations Research or Applied Mathematics (double degree).