MASTER FOR SMART DATA SCIENCE

MASTER IN ENGLISH

ENSAI

THE NATIONAL SCHOOL
FOR STATISTICS AND DATA
ANALYSIS IN FRANCE

"Rather than worrying about Big Data, companies would do well to instead focus on Smart Data"

Bernard Marr, Advanced Performance Institute

ENSAI's program goes beyond Big Data; it has shifted its emphasis to Smart Data, thus meeting the vital challenge of analyzing the relevant data directly at their source. Smart Data focuses on revealing the **Value** and **Veracity** from the Volume, Variety and Velocity of Big Data.

Thanks to ENSAI's renowned expertise in Data Science and its innovative approach in training specialists to process and analyze data, strong links have been built with the professional world and graduates are highly sought after. This unique program is taught entirely in English.

CALENDAR AND PROGRAM

The program includes **one semester of coursework at ENSAI,** which is followed by a four to six-month paid internship in France or abroad within the professional world or academia/research laboratories.

	Semester 1	Semester 2
August	**September through February**	**Starting in March**
▼	▼	▼
Intensive French Summer Program*	**Courses, Projects, Professional Lectures** 30 credits	**Internship (4 to 6 months)** 30 credits

* An intensive French program for non-French speakers precedes the program. These students also benefit from French classes throughout the academic year.

A WORD FROM THE DIRECTOR OF ENSAI

"Many Master's degrees in Data Science have emerged in this era of Big Data, most of which are highly IT oriented. ENSAI, the most specialized graduate school in Statistics in France, has naturally chosen a different path. Students learn not only the latest in Computer Science technology; they are also trained to deeply understand the mass of data and to master algorithms and statistical modeling skills that are essential to identifying relevant and valuable information."

Olivier Biau

PROGRAM OBJECTIVES

Students will

- Learn the methodological aspects and the practical skills needed to become a Data Scientist in order to meet the growing needs of a large variety of industrial and service companies and organizations in fields such as retail, manufacturing, financial markets, insurance, healthcare, energy, and public administration.

- Acquire the core concepts of data management, the necessary tools to access, handle, and analyze massive amounts of heterogeneous data.

- Master the mathematical models and algorithms vital for rapidly extracting information from data.

- Develop knowledge for deep understanding of data, creating insight.

- Have the opportunity to follow research-oriented modules to prepare for a PhD in Statistics or Machine Learning

Arnaud LAROCHE

Associate
ERNST & YOUNG ADVISORY

Data Scientists educated at ENSAI possess the essential skills for Big Data projects. As mathematicians, they choose, adapt, and apply various approaches from the fields of Statistics and Artificial Intelligence to extract value from the data being exploited. As computer scientists, they identify pertinent data from information systems, program algorithms to exploit them, and help design infrastructure that will make rapid use of the results obtained. As experts in their field, their analyses seek to promote efficiency and profitability in businesses. They enrich dialogue with the process managers they accompany, going beyond the simple role of technical experts; they also focus on how their work impacts the overall business of the company.

ENSAI

CURRICULUM

Semester 1

Machine Learning (60h)
Machine Learning for Data Science
Deep Learning
Dimension Reduction and Matrix Completion

Models for Dependent Data (42h)
Machine Learning for Time Series
High Dimensional Time Series

Statistics for New Data (42h)
Functional Data Analysis
Graphical Models and Latent Structures

Advanced Tools for Data Analysis and Computing (33h)
Data Visualization
Parallel Computing with R and Python

IT Tools (42h)
IT Tools 1 (Hadoop & Cloud Computing)
IT Tools 2 (NoSQL, Big Data Processing with Spark)

Cases Studies and Project (48h)
Smart Data Project or Research Project
Topics, Case Studies, Conferences, or Research Project

Semester 2: Internship*

4-6 month professional experience followed by final report and jury defense

* If the internship is carried out in France, by law it must be paid.

SOME OF OUR PARTNERS

Guillaume FRANCHI

STUDENT FROM FRANCE

The program was a challenging, but also exciting adventure in my life. The intense and extensive learning of innovative techniques in Data Science quickly created links within our small group of students; we all shared our knowledge and personal experience which made us much stronger. This program is also the opportunity to evolve toward new careers. After 9 years of teaching in high school, I felt the need to come back to research, at the confluences of Mathematics and Computer Science. This training tremendously served my project, as I just started my PhD at ENSAI about the modeling of abundance data in ecology. I still have a long way to go, but I think all the former "Smarties" would tell you that this program opens a plethora of opportunities.

Hornella FOKEM FOSSO

STUDENT FROM CAMEROON

The Smart Data program offered me the possibility to acquire and improve skills in three fields: Applied Mathematics, Statistics, and IT. The program is really dense and it provides a wide range of tools for processing, modeling, and analyzing data of different natures. The classes are taught by ENSAI professors and industry experts in their fields. The lectures are therefore a perfect mix of theory and real-world examples of how the techniques can be applied. The different practicals done in groups also gave me experience in working in a team of people with different backgrounds. At the end of the year, I really felt ready to start a career in Data Science.

Marius STERLING

STUDENT FROM GERMANY

The fast-paced Smart Data program at ENSAI provided me with the necessary knowledge to pursue a Ph.D. in the field of Data Science and Machine & Deep Learning. Especially the small class size was an excellent opportunity to foster critical thinking through in-depth discussions about mathematical concepts, models, and their practical application.

Learning useful IT tools gave me a head start compared to many other PhD candidates and colleagues. In addition, they were an excellent starting point to learn and apply advanced Data Science tools all by myself.

The internship offered a great chance to give working in a research unit a try and to have first points of contact in the research field.

STRONG LINKS
WITH THE PROFESSIONAL WORLD

- A program involving numerous projects supervised by professionals

- The annual ENSAI Business Forum with over 60 participants, from start-ups to large groups, to help students find an internship and/or a future job

- The ENSAI Career Center, an online tool to help students kick start their future careers

PROFESSIONS

Graduates of the program are skilled Data Scientists

In addition to **doctoral possibilities** in research, graduates have numerous career opportunities in international corporations and data start-ups in many fields including:

- **Business Analytics**
- **Smart Society**
- **Internet of Things**
- **Social Networks Analysis**
- **Personalized Medicine**
- **Supply Chain Optimization**
- **Smart Grid Optimization**
- **Artificial Intelligence**

WHY ENSAI?

Reputation

ENSAI is a top graduate school for Data Science (one of the prestigious French *Grandes Écoles*) with cutting-edge expertise in Statistics, Computer Science, and Economics. Renowned researchers from France and abroad assure high-quality teaching.

High Employment

Thanks to the renown of the school, ENSAI alumni are highly sought after by employers in the private and public sectors. Its highly-skilled graduates enjoy an exceptional employment rate.

Human Scale

The small student body for this Master program receives a personalized welcome, and ENSAI's faculty members and researchers from partners are readily available for students.

International Vision

Partnerships with prominent institutions around the world have been fostered to prepare students for international careers (eg. Aarhus University, Colorado State University, East China Normal University, Erasmus School of Economics Rotterdam, Humboldt-Universität zu Berlin, University of Rome "La Sapienza", University of Warwick).

STRONG POINTS OF THE PROGRAM

- **Explores a unique field where Statistics, Applied Mathematics, and Computer Science converge**
- **Addresses practical, real-world issues and provides a solid theoretical background**
- **Prepares for a career with rapidly-increasing employment worldwide**

IT TOOLS

Cloud Computing
Hadoop, NoSQL, Spark
Python, R

ACCREDITATION

French Ministry of Higher Education, Research and Innovation

MINISTÈRE
DE L'ENSEIGNEMENT
SUPÉRIEUR,
DE LA RECHERCHE
ET DE L'INNOVATION
Liberté
Égalité
Fraternité

LOCATION

ENSAI is located on the Ker Lann Campus, near the cosmopolitan city of Rennes, France. Only 90 minutes from Paris by train, Rennes is known for its many cultural events and festivals, as well as being a lively student city with two major universities and a number of graduate schools. Rennes is the capital of Brittany, a region renowned for some of France's most spectacular coastline and landscapes.
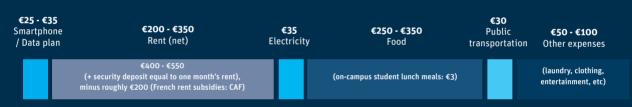
Rennes

ACCOMMODATION

All Ker Lann Campus residence halls are open to ENSAI students
→ **www.campuskerlann.com/vie-campus/se-loger**

Many of ENSAI's international students are warmly welcomed at Résidence Univercity.

COST

- €4,000 for EU/EEA/Swiss students

- €6,000 for non- EU/EEA/Swiss students

- See website for precise criteria

COST OF LIVING

Estimated monthly expenses: €600-€900

€25 - €35
Smartphone / Data plan

€200 - €350
Rent (net)

€400 - €550
(+ security deposit equal to one month's rent), minus roughly €200 (French rent subsidies: CAF)

€35
Electricity

€250 - €350
Food

(on-campus student lunch meals: €3)

€30
Public transportation

€50 - €100
Other expenses

(laundry, clothing, entertainment, etc)

ADMISSION AND LANGUAGE REQUIREMENTS

- All applicants must have a minimum of 4 years of higher education (at least a 4-year BSc, or the first year of an MSc). Strong mathematical background and advanced computer science knowledge are required.

- Applications are pre-selected based on candidates' degrees, level, and skills. Final admission is granted following a personal interview (in person or via videoconference).

- **Language 1: English** (all coursework and examinations)
  - Minimum level of B2 CEFR
  - Common certificates accepted (eg. TOEIC, TOEFL, IELTS, Cambridge CAE)

- **Language 2: French** (practical life)
  - No minimum level required.
  - Intensive Summer French courses available at extra cost

ENSAI

CONTACT

smart.data@ensai.fr
Tel: +33 (0)2 99 05 32 08

Campus de Ker Lann
51 rue Blaise Pascal - BP 37203
35172 Bruz Cedex - France

www.ensai.fr

→ Full procedures, applications and deadlines available at www.ensai.fr under "Admission > Master for Smart Data Science"