Toulouse School of Economics

Master Econometrics, Statistics

Data Science for Social Sciences

Program 2025/2026

DIPLÔME NATIONAL DE MASTER CONTRÔLÉ PAR L'ÉTAT

Objectives

The master's program « Econometrics, Statistics » aims to give the students intending to pursue advanced professional careers or doctoral research a solid culture in economics, statistics and data science, as well as in various related fields of applied mathematics.

The first year of the international track « Data Science for Social Sciences » offers up to date general courses in theoretical economics, econometrics and mathematics of machine learning and AI, illustrated with the help of modern softwares for data scientists. As well, it also offers some specialization courses in mathematics and their applications such as, for instance, finance, data bases, Markov chains, martingales theory, optimization, time series and high dimensional data analysis.

The second year of this master emphasizes advanced and applied techniques in data science, statistics and econometrics. It offers deeper courses in data science, particularly in mathematics of machine and deep learning algorithms, optimization for deep learning, data mining, big data, regulation of data spreading and data protection, as well as specialized courses in different fields of application of statistics to social sciences, such as spatial econometrics, graph analysis, survey sampling, scoring, extreme risk analysis and web mining. Moreover, this second year of the program offers higher level courses of massive databases management and statistical software, namely R, Python and Julia. The different courses allow students to acquire versatile skills in the processing of complex data (panel, survey, survival, graph, spatial) with modern parametric, non-parametric, and learning statistical methods.

This international track aims to train "data scientists", "data analysts", "project managers", "engineers" and/or "consultants" in statistics with backgrounds in economics and econometrics. The graduates benefit from direct professional integration not only in the tertiary sector (e.g. quantitative marketing, banking, insurance), but also in industry and academic research.

Note: students can apply to either the full program (i.e. two years) or directly to the 2nd year (refer to the Admission section for further information)

First year courses – Data Science for Social Sciences

SEMESTRE 1	SEMESTRE 2
Compulsory courses: • Probability and Statistics for Data Science* • Software for Data science (R, Python, Julia) • Intermediate econometrics * • Applied econometrics* • Introduction to Convex Optimization for Machine Learning * • Professional Development • FLE	**Compulsory courses:** • Foundations of Machine Learning* • Applied econometrics* • Stochastic Methods for Optimization and Sampling * • High Dimensional Data Analysis and Machine Learning * • FLE
2 electives from 6: • Markov chains and applications • Evolution of economic behaviour • Understanding real world Organizations • Project management • Market Power & Regulation • Markets and Incentives: a historical-theoretical perspective	**2 electives from 8:** • Industrial Organization** • Corporate Finance** • Market Finance** • Dynamic Optimization • Martingales theory and applications • Time series** • Data Bases ** • Program Evaluation*
End of August refresher courses - Math Camp: • Algebra Refresher *** • Probability refresher *** • Static Optimization refresher *** • Econometrics refresher ***	Internship or Master Thesis*

* UE1/UE2/UE5: A minimum grade of 10 out of 20 is required.
** Masters 2 Directors recommend attending certain options:
- 'Times series': M2 Statistics and Econometrics
- Corporate Finance and Market Finance: M2 Finance
- Time Series: M2 EEE

*** Math camp for M1 and M2 students

Bonus point
Practicing a sport or a musical activity within the University orchestra during the year can give you bonus points. Only points above 10/20 are taken into account.

Second year courses – Data Science for Social Sciences (Initial training)

SEMESTRE 3	SEMESTRE 4
Compulsory: ● Scoring (I,II,III) ● Optimization for deep learning ● Advanced Software for Data science : Julia, R, Python and Excel ● Data Mining ● Mathematics of Machine and Deep Learning Algorithms ● Non-parametric models ● Survey Sampling ● Communication or French as a Foreign language (FLE)	**Compulsory:** ● Statistical Consulting**** ● Big Data : Part 1 Part 2 Part 3 ● Graph analysis ● Extreme risk analysis ● Spatial econometrics ● Data bases ● Web Mining ● Communication or French as a Foreign language (FLE) **1 among 3 :** ● Datanomics : regulation of data spreading and data protection ● Déontologie des études sociales ● Project management(i) Ethics of social studies
Non-Mandatory: ● Algebra Refresher*** ● Probability Refresher*** ● Dynamic Optimization Refresher*** ● Professional Development**	**Internship of master thesis**

*** Students who have attended the Professional Development/Coaching course in 2024/25 are exempted*

**** Maths refreshers courses for 1st and 2nd year master students*

*****Groups of 4 students*

(i) Students who have attended Project Management in M1 cannot register in M2. And (i) Depending on the compatibility of the schedule

- **Internship:** duration typically of 6 months graded on the basis of the internship report and of the oral defense.

- **Tutored projects:** (a) the Statistical Consulting course (4 students per group) is a project proposed by a company and supervised by 2 teachers/researchers, with a report to be delivered to the client before the final defense; (b) collective projects (2 to 4 students per group) for several courses (e.g., Survey sampling, Non-parametric models, and Spatial Econometrics) supervised by a teacher, with a final oral defense.

- **Master thesis** (alternative option to the internship): topic of your choice supervised by a teacher or a researcher, with a final oral defense in M2 and without defense in M1.

Bonus point

Practicing a sport or a musical activity within the University orchestra during the year can give you bonus points. Only points above 10/20 are taken into account.

SKILLS

- Using the latest methods in machine and deep learning
- Processing and modeling of complex data
- Mastering statistical software and massive database management
- Gaining direct exposure to professional work environments with statistical consulting workshops and apprenticeships

CAREER/JOBS

- Economic Analysts, Consultant, Data scientists and project managers for all data-driven policy and decision-making requirements
- Careers in public institutions to orientate public policies or to impact decisions of institutions, major companies in finance, industrial sector, banking, insurance and much more.

ALUMNI AND PROFESSORS FEEDBACK

Rémi Perrichon

PhD candidate in statistics – Lecturer in the TSE Master's program and at Ecole Nationale de l'Aviation Civile - TSE graduate

It's a fact: there are more and more data scientists on the job market. On the one hand, large groups are actively seeking to take the turn of AI, and on the other hand, training and professional reconversions around data are multiplying. TSE is one of the few institutions that does not compromise with theoretical requirements and really values their applications. Studying with renowned researchers allows students to learn the most advanced methods and to strengthen their critical thinking. The high availability of the teaching staff provides an ideal framework for developing in an international and friendly environment.

Sébastien Gadat

Professor of Mathematics – TSE

Mathematics, Statistics and optimizations are at the forefront of the sudden amazing rise of machine learning and artificial intelligence. AI is now commonly accepted as one of the main intellectual advances and source of economic development for the next years. Understanding how to benefit from these novelties especially in the field of social sciences, economics and econometrics is one of the challenge targeted by the D3S master of TSE. Students of the D3S master of TSE will not only learn about the up-to-date nowadays developments of problems and methods in data science, but will also benefit from the TSE environment to acquire specific modeling knowledge in economics and econometrics.
This master constitutes and proposes a unique mix of expertises in both AI, mathematics of machine learning and quantitative social science, which will shape the future of gold standard data scientists for quantitative economy and econometrics.

ADMISSION

Admission is based on academic excellence. The program is aimed at fluent English speakers.

First year

- Students should hold a BA or BSc in Economics, Statistics or Applied Mathematics, or any recognized curriculum considered as consistent with the program and approved by the TSE selection committee.

Second year

- Applicants from the French higher education system must have validated TSE's 1st year of Master's in Data Science for Social Sciences or another 1st year of Master's in Statistics, Applied Mathematics and/or in Economics in a university or an institution offering an equivalent 4-year degree (e.g., engineering school,…).

- For foreign degree holders, the required degrees are either a BA or BSc, M.A., or MSc, within a recognized curriculum regarded as consistent with the program and approved by the TSE selection committee.

- Some brushing-up in Economics or Maths might be advisable in some cases.

Application Process

For more details about enrollment and application process, we invite you to visit the Admission section.

INFORMATION

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Administration

Email:study-m1@tse-fr.eu (1st year)
Or study-m2@tse-fr.eu (2nd year)
Admission Office: admissions@tse-fr.eu

Program Directors:

- 1st year Master: Sébastien GADAT - sebastien.gadat@tse-fr.eu
- 2nd year: Abdelaati Daouia – abdelaati.daouia@tse-fr.eu