Toulouse School of Economics

Master in Mathematics and Economic Decision

Program Directors: Stéphane Villeneuve and Eric Gautier

Program 2022-2023

DIPLÔME NATIONAL DE MASTER CONTRÔLÉ PAR L'ÉTAT

The two-year Master's program in Mathematics and Economic Decision is the Toulouse School of Economics Master in Applied Mathematics and Statistics. It benefits from the strength of both the TSE's Mathematics and Economics departments. Interdisciplinarity is very important in recent developments in research, for example at the interface between optimization and statistics. These developments have wide and natural applications in economics and in the industry: artificial intelligence, big data, game theory, high-dimensional analysis, machine learning, network analysis, stochastic analysis, etc.

The first year is dedicated to acquiring a broad and rigorous knowledge in mathematics and statistics and its applications to economics.

The second year of this program is targeted to students interested in research-based training in Applied Mathematics and Statistics. It can be regarded as a first year of a Ph.D. program in the north American system. Successful students who would be interested in a PhD in Applied Mathematics and Statistics can apply for scholarships with the support of the program faculty to complete their PhD in Toulouse or outside of Toulouse. The Ph.D. can be either academic or professionally oriented. The second year of the Master can also be a good fit for a student interested by research-based learning but who prefers a professional integration directly after the Master, for example as a mathematical engineer with a strong background in Economics.

Alternatively, after the first year, the students may apply to other second year Master's programs at TSE. The second year of the Master Data Science for Social Science is particularly suited for a professional integration after the Master. Students who become more interested in the Ph.D. in Economics may apply to the second year of the Master Economic Theory and Econometrics.

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

Courses

First year– Mathematics and Economic Decision

SEMESTRE 1	SEMESTRE 2
Compulsory courses: • Intermediate Econometrics* • Mathematical Statistics 1* • Mathematical Game Theory 1* • Advanced Analysis* • FLE • Professional Development	**Compulsory courses:** • Mathematical Statistics 2* • Mathematical Game Theory 2* • Program Evaluation* • FLE
Electives 2 among 4: • Macroeconomics* • Markov Chains and applications++ • Theory of Incentives • Optimization	**Optional 4 among 7:** **towards doctoral track in Economics** • Advanced Macroeconomics • Advanced Microeconomics • Corporate finance** • Industrial Organization ** • Market finance** • Martingales theory and applications++ • Dynamic optimization **Optional 4 among 7:** **towards MED 2 track** • Corporate finance** • Introduction to big data**+ • Market finance** • Martingales theory and applications • Optimization for big data**+ • Time series** • Dynamic optimization
End of August refresher courses – Math Camp: • Algebra refresher *** • Probability refresher *** • Static Optimization refresher ***	**Internship or Master thesis***

** Core courses*
***** Masters 2 Directors recommend to attend some options:***
Introduction to Big Data or Optimization for Big Data or Time Series: M2 Stateco
Industrial Organization: M2 EMO
Corporate Finance et Market Finance: M2 Finance
Time Series: M2 EEE
**** Mathematics refresher courses, for TSE M1 and M2 students*
+ Introduction to big data and Optimization for big data courses are opened to the first 45 registered students (on the come first/first served basis).
++ A minimum grade of 10 out of 20 is required

Courses

Second Year– Mathematics and Economic Decision

SEMESTER 3	SEMESTER 4
Elective courses. Choose 18 ECTS • Optimization 6 ECTS • Mathematics of Machine and Deep Learning Algorithms 6 ECTS • Game Theory 6 ECTS • Microeconomics 1 6 ECTS • Econometrics 1 6 ECTS • Topics in MED 1 6 ECTS **** • Topics in MED 2 3 ECTS **** • Non Parametric Models 3 ECTS • Survey Sampling 3 ECTS • Optimization for Deep Learning 3 ECTS • Advanced Topics in Artificial Intelligence 6 ECTS • Techniques du Decisionnel et Big Data 3 ECTS **Facultative:** • Statistical Software: R • Statistical Software: Python	**Elective courses: Choose 18 ECTS** • Stochastic Optimal Control in Economics 6 ECTS • Econometrics 2 6 ECTS • Big Data 6 ECTS • Microeconomics 2 6 ECTS • Economic Theory 6 ECTS • Topics in EEE 6 ECTS • Capital Market 6 ECTS • Corporate Finance: Theory and Empirics 6 ECTS • High Dimension Models 3 ECTS • Topics in MED 3 **** 6 ECTS • Topics in MED 4 **** 3 ECTS **Compulsory:** • Reading Course
End of August refesher courses - Math Camp: • Algebra Refresher • Probability Refresher • Dynamic Optimization Refresher	**Internship or master thesis**

*Cours de remise à niveau en mathématiques, ouverts aux étudiants de M1 et M2 de l'Ecole
**Correspond à l'UE Advanced topics in Artificial Intelligence du bloc de spécialité du master 2 2IS
*** Un cours au choix parmi le bloc de spécialité du master 2 ISIADE
**** Cours au choix
ou Possibilité de suivre un cours d'un professeur invité (Sous réserve de validation du responsable pédagogique du Master)
ou Possibilité de suivre un cours d'une école de recherche (Sous réserve de validation du responsable pédagogique du Master)
ou Possibilité de suivre des cours dans d'autres Master 2 (Sous réserve de validation du responsable pédagogique du Master)

First year Acceptance criteria and enrollment

- Students with an undergraduate degree who majored in Economics or Economics and Mathematics at the Toulouse School of Economics TSE and able to justify a good English level (TOEFL, IELTS or Cambridge English Advanced Certificate C1 level required) are eligible to enroll in the M1 program “Mathematics of Economic Decision", international track entirely taught in English.

- Or by application review:
  - Students with an undergraduate degree in an economic and mathematics field or mathematics field;
  - French or foreign students with a degree and credits considered equivalent, and able to justify a good English (TOEFL, IELTS or Cambridge English Advanced Certificate C1 level required) and Mathematics Level (GRE required for foreign students).

Second year - Acceptance criteria and enrollment

Students majored in the M1 program "Mathematics and Economic Decision" are eligible to enroll in the M2 program.

- Or by application review:
  - Holders of a master's degree in mathematics who can justify some knowledge of Economics or are willing to prepare for it before the beginning of the program and who are able to justify a good English level, international track entirely taught in English.

Application Process

Applications are considered in November for Eiffel scholarships applicants, in January for other foreign degree holders and French degree holder for the 1st year Master only and in May for French degree holders for the second year : www.tse-fr.eu/admissions

Information

Administration:
Building T – 1st floor
Université Toulouse 1 Capitole
1 esplanade de l’Université
31000 Toulouse
Tel: +33 (0)5 61 12 86 54
Website: www.tse-fr.eu
Email: scoltsem1@ut-capitole.fr
Admission Office: TSE-admissions@ut-capitole.fr

Program Director:

1st year Master program Stéphane Villeneuve : stephane.villeneuve@tse-fr.eu
2nd year Master program: Eric Gautier - eric.gautier@tse-fr.eu