

# Curriculum Vitae

**Sébastien GADAT**

Date of birth : 07/12/1978 - Age : 45 Nationality : French - Single, 3 children

## Current professional situation :

**Professor of statistics and applied mathematics Toulouse School of Economics - UMR 5604**

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**Associated member of Institut de Mathématiques de Toulouse - UMR 5219**

Université Toulouse 3, 118 route de Narbonne, 31400 Toulouse.

**Associated member of CMAP, Ecole Polytechnique**

Ecole Polytechnique, route de Saclay, 91128, Palaiseau.

## Academic positions

- **2018-2023: Junior Member IUF – Section mathématiques**
- **2018-:** Professor – Statistics and machine learning, **Ecole Polytechnique.**
- **2014-:** Professor – Statistics and machine learning, **Toulouse School of Economics**
- **2005-2014 :** Associate Professor – Université Paul Sabatier, Toulouse 3.

## Education

- **2012 :** French “Habilitation à Diriger des Recherches”. Université Paul Sabatier.  
Title : “High dimensional statistics. Non reversible optimization.”

Advisor : Patrick Cattiaux. Reviewers : Pierre Del Moral, Gabor Lugosi, Stéphane Mallat.  
Committee : P. Cattiaux, D. Chafaï, P. Del Moral, F. Gamboa, S. Mallat, C. Prieur.

- **2001-2004 :** PhD Thesis in Applied mathematics.  
CMLA, ENS de Cachan / CIS, Johns Hopkins University, Baltimore.  
Title : “Statistical learning of a symbolic vocabulary for object detection”

Advisors : L. Younès, D. Geman. Reviewers : R. Abraham, M. Benaïm.  
Committee: R. Abraham, M. Benaïm, D. Geman, L. Moisan, A. Trouvé, L. Younès.

- **2002-2005 :** PhD student – Ecole Normale Supérieure de Cachan.
- **2001 :** Agrégation de Mathématiques - Competition for high-school professors in Mathematics.
- **2000 :** MSc – Université Paris-Dauphine & ENS Cachan
- **1998-2002 :** Fellow of the Ecole Normale Supérieure de Cachan.

# I - Research fields

My expertise of research concerns statistics, machine learning, probability and optimization with applications to deep learning, engineering, financial mathematics, biology and medicine. I describe below a list of my research interests, grouped in an approximate thematic order.

## **Stochastic optimization and sequential learning**

### **Large scale Optimization**

### **Machine learning and high dimensional statistics**

### **Inverse Problems, Non-parametric statistics, Mixture models**

### **Biostatistics and application to medicine**

### **Applied probability and modelling**

## **PhD and post doc supervision**

### **1 Completed PhD Thesis:**

**[1] 2005-2008** : PhD Thesis of K.-A. Lê Cao (joint supervision with P. Besse). (MESRI funding)  
Title : *Statistical method of variable selection and omic integration*. Awarded the Marie-Jeanne Duhamel Price.  
Now researcher in Biostatistics, University of Queensland, Brisbane, Australia.

**[2] 2011-2014** : PhD Thesis of C. Christophe (joint supervision with P. Cattiaux). (MESRI funding)  
Title : *Probabilistic modelling with a prey-predator system of cytotoxic cells and melanoma tumor*  
Now teacher in high school in France

**[3] 2011-2014** : PhD Thesis of M. Champion (MESRI funding)  
Title : *Regulation network inference : modelling, estimation and algorithms in high dimensional statistics*.  
Now : Assistant Professor in Univ. Paris 5

**[4] 2013-2016** : PhD Thesis of S. Saadane (joint supervision with F. Panloup). (MESRI funding)  
Title: *Stochastic algorithms for learning, optimization and approximation of stationary distributions*  
Now : teacher in high school in France

**[5] 2014-2017** : PhD Thesis of C. Bouttier (joint supervision with S. Gerchinovitz). (Cifre funding)  
Title : *Optimization under uncertainty : stochastic algorithms and continuous bandits. Application to trajectories optimization*.  
Now : research engineer at Airbus Group.

**[6] 2014-2017** : PhD Thesis of I. Gavra (joint supervision with L. Miclo). (MESRI funding)  
Title : *Stochastic algorithm under uncertainty with complex structures. Convergence and applications*  
Now Assistant Professor, Univ. Rennes 2.

**[7] 2019-2022** : PhD Thesis of A. Doury (joint supervision with S. Somot, Météo France) (Meteo Funding)  
Title : *Machine learning for statistical downscaling with deep learning. Application to meteorological forecasting*.  
Now: Post Doc Meteo France.

**[8] 2021-2024:** PhD Thesis of M. Crespo (joint supervision with X. Gendre, ISAE) (Eur Funding)  
Title: On stochastic algorithms for Bayesian inference on financial assets.  
EUR MINT funding.

**[9] 2021-2024:** PhD Thesis of Dung Le Anh (joint supervision with S. Villeneuve) (Anr funding)  
Title: On McKean-Vlasov S.D.E. with density dependent drift. ANR MASDOL funding.

## **2. Post Doc supervision:**

**[1] 2015-2016 :** Post doc of M. Costa (graduated from E. Polytechnique and ENS Paris) (Oncopole funding)  
Title : *Biased competition model for CTL/tumor nodule confrontation. Statistical issues and medical forecasting*  
Now : Associate professor at University Toulouse 3.

**[2] 2020-2021:** Post doc of M. Chassan (graduated from Univ. Toulouse 3) (Oncopole funding)  
Title : *Hidden Markov Model for CLL dynamics : statistical inference and prediction*  
Now : post doc at the French national center of research in agronomy (INRA)

**[3] 2023-2024:** Post doc of C. Lalanne (graduated from ENS. Lyon and ENS Paris) (Huawei funding)  
Title : *On Barzilai & Borwein stochastic gradient optimization method.*

## **3. Master Student (recent years):**

**[1] 2020:** MSc of E. Siviero (graduated from MVA Paris Saclay)

**[2] 2021:** MSc of Dung Le Anh (graduated from TSE)

**[3] 2021:** MSc of M. Crespo (graduated from Paris Dauphine)

## II - Financial support and research projects

Since the beginning of my career in 2005, I have been regularly involved in several research projects. These projects were either academic ones (ANR, foundations, etc) or industrial ones (CIFRE, etc). Some of them are multi-disciplinary and other ones focused on statistics and optimization.

Title and Period	Principal Investigator	Researchers
<b>Tiris Grant</b> 240 k€	<b>K. Van der Straeten</b>	Afantenos, Costa, Grandi, (UT3) Gadat, VdStraeten (TSE), Gaillac (Oxford)
<b>ANR Gatsbi<sup>2</sup></b>	<b>T. Klein (Enac)</b>	Klein, Gadat, Lagnoux, Rochet (Toulouse) Ioos (EDF), Da Veiga (ENSAI), Labreuche (Thales)
<b>ANR MAD</b>	<b>S. Vaïter (Nice)</b>	Bolte, Gadat, Pauwels (TSE) Vaïter, Caillau, Laguel (Nice) Fort, Iutzeler (UT3)
<b>Huawei Grant</b> 140 k€	<b>S. GADAT</b>	Bolte, Gadat (TSE)
<b>ANR Masdol</b> 2019-2023 470 k€	<b>S. GADAT</b> <a href="https://perso.math.univ-toulouse.fr/masdol/">https://perso.math.univ-toulouse.fr/masdol/</a>	Bolte, Renault, Gadat (TSE) - Dossal, Fort, Pauwels, Rondepierre, Serrurier (IMT) - J.F. Aujol, B. Bercu, J. Bigot (IMB)
OpSiMorE 2018-2022, prix Del Duca	<b>G. Fort (UT3)</b> <a href="https://perso.math.univ-toulouse.fr/gfort/project/opsimore/">https://perso.math.univ-toulouse.fr/gfort/project/opsimore/</a>	L. Huang, M. Costa, F. Fort (IMT)
<b>COSAL</b> 2017-2019 <b>Foundation J. Hadamard</b>	<b>S. GADAT</b>	J. Bolte, G. Fort, S. Gadat, A. Juditsky, F. Panloup, M. Rousset, P.A. Zitt
<b>COMPUTREAT</b> 2015-2019 Plan Cancer - <b>100 K€</b>	<b>S. GADAT</b>	M. Costa, S. Gadat, F. Malgouyres, L. Risser
<b>TOXIMATH</b> Plan Cancer- <b>100 k€</b>	<b>S. GADAT</b>	M. Costa, S. Gadat, P. Cattiaux
<b>ANR DEMOS</b> 2010-2014 <b>50k€</b>	<b>S. GADAT</b> <a href="https://sites.google.com/site/anrdemos/">https://sites.google.com/site/anrdemos/</a>	J. Bigot, S. Gadat, J.M. Loubes, C. Marteau
<b>INTEGRITY</b> 2009-2011 THALES/CNES <b>150k€</b>	J.M. Azais	J.M. Azais, S. Gadat, A. Lagnoux, C. Mercadier
<b>MMI</b> 2010-2013 Inserm-CNRS <b>150k€</b>	P. Cattiaux	P. Cattiaux, C. Christophe, S. Gadat, S. Valittutti

## **III - Research administrative tasks and scientific animation**

I have participated to several research academic tasks in Université Toulouse 3 (when I was assistant professor) and in the Toulouse School of Economics as a professor. In particular, I am involved in the research group direction. I also have been involved in the organization of several workshops and working groups.

### **III-1 Research group animation**

**2019-.** : Head of the « **Analyse et économie des Big Data** », Digital Center, TSE-Partenariat

**2017-2021:** Head of the research group **MADS** at TSE (around 30 researchers and 15 PhD students).  
<https://www.tse-fr.eu/groups/mathematics-decision-making-and-statistics?lang=en>

### **III-2 Animation and organization of scientific events**

#### **Conferences**

- **2021-.**: TSE statistical seminar.

- **05-2021** : Joint Organization of an ANR Workshop « **Stochastic Optimization and Deep Learning** ».

- **09-2018** : Joint Organization of the international conference : « **Optimization and Learning** » with G. Fort, S. Gadat, and C. Févotte.  
<http://www.cimi.univ-toulouse.fr/optimisation/en/workshop-optimization-and-machine-learning>

- **09-2018** : **organization** of the workshop «Second meeting UT1/UT3 »  
Second year (see below).

- **06-2018** : **Joint Organization of the International workshop** : « Aspects fondamentaux et Exploitation de la structure » with G. Fort and C. Dossal as co-organizers ;  
<http://cimi.univ-toulouse.fr/optimisation/fr/workshop-optimisation-aspects-fondamentaux-et-exploitation-de-la-structure>

- **09-2017** : **organization** of the workshop « First meeting UT1/UT3 »

<https://www.tse-fr.eu/fr/conferences/2017-rencontre-ut1-ut3>

This small workshop (45 participants) was organized by C. Pellegrini (UT3) and I and took place in TSE on september 2017. He presented during 1 day several fields of research in applied mathematics (statistics, optimization, game theory and P.D.E.)

- **07-2017** : **co-organization** of the workshop *Image, Optimization, Probability and Statistics*

<https://sites.google.com/site/journeesiosps/home/>

The organization was led by J. Bigot (IMB). We organized this workshop during 3 days at the Teich center of conference, there was around 40 participants. The thematics of the talks was around optimal transport, statistics on manifold ((with two courses of G. Carlier and M. Arnaudon) and stochastic algorithms.

- **2015-2016** : TSE statistical seminar. <https://perso.math.univ-toulouse.fr/gadat/tse-statistical-seminar/>

The TSE statistical seminar was planned every week, except during the holidays. The

- **06-2015:** **co-organization** of the conference

*Journées de Probabilités 2015* <https://jp2015.sciencesconf.org/>

This big conference occurs every year during one week and gathers probabilists of France. A special place is

reserved for young researchers. The number of participants was around 100.

**- 11-2014 : co-organization** of an ANR workshop

*Optimal transport application to signal processing and statistics*. Toulouse

<https://sites.google.com/site/anrdemos/events-and-meetings/workshop-imt-17-18-novembre-2014>

This workshop was organized as the ending event of the ANR DEMOS project. We have selected the « optimal transport » research theme as it represent a promising point of view for signal and image deformation. It has gathered more than 50 participants with at the least 25 from other universities.

**- 08-2014 : organization of one session** of the MAS conference:

*Bayesian high dimensional statistics*. [www.math.univ-toulouse.fr/MAS2014/](http://www.math.univ-toulouse.fr/MAS2014/)

I selected and invited talks for this big general workshop. One session represents one afternoon of talks (3 sessions in parallel).

**- 05-2013 : organization of one session** of the SFDS conference : *Non parametric statistics*

<http://jds2013.sfds.asso.fr/>

I had only a small influence on this session since the talks were selected by the scientific board.

**- 06-2011 : co-organization** of an ANR workshop *Statistical analysis of deformable signals*.

<https://sites.google.com/site/anrdemos/events-and-meetings/working-day-imt-17-juin-2011>

This workshop was the launching event of the ANR DEMOS project. We have chosen a thematic of research centered around non parametric statistics and signal processing. There was around 30 participants.

**- 09-2010 : organization of one session** of the MAS conference :

*Statistics and signal processing* <https://www.math.u-bordeaux.fr/MAS10/>

I selected and invited talks for this big general workshop. One session represents one afternoon of talks (3 sessions in parallel).

**- 06-2009 : organization of one session** of the EMS conference.

*Multiresolution analysis in non parametric statistics*

<http://www.math.univ-toulouse.fr/EMS2009/4-17613-EMS2009.php>

I had only a small influence on this session since the talks were selected by the scientific board.

### Annual Lab Working Groups

**- 2011-2012** : joint organization (with C. Maugis) of the WG in statistics *Non parametric Bayesian statistics*.

**- 2008-2009** : with J. Bigot of the WG in statistics *Statistics on manifolds*.

**- 2009-2010** : with F. Panloup of the WG in probability *Non markovian diffusions*.

### Scientific board

**- 2021-.** : **Chier Editor** of : Esaim Proceedings and Surveys

**- 2015** : Financial Econometrics Conference.

<https://www.tse-fr.eu/fr/conferences/2015-financial-econometrics-conference>

**- 2016** : EC2 Conference on Econometrics and Big Data,

<https://sites.google.com/site/ecpower2/news/ec22016toulousedecember16-17>

### **III-3 Evaluation**

I have participated to several research project evaluations in France and abroad. I also regularly review research papers mainly in the field of statistics, optimization and applied probability.

#### **HCERES:**

2023: Member of the scientific committee for the evaluation of the LPSM (Sorbonne Université & Paris Cité)

#### **Phd/HDR:**

Board : M. Costa (Ecole Polytechnique), K.A. le Cao (Insa Toulouse), E. Pauwels (UT3), O. Sebbouh (Ens Paris), T. Guédon (Orsay)

Reviewer : F. Logé (Ecole Polytechnique), A. Karagulyan (Ensaé) , A. Barakat (Telecom Paris), Y. Russac (Ens Ulm), N. Werge (PSL), R. Leluc Telecom Paris), A. Godichon-Baggioni (PSL), V. Plassier (Ecole Polytechnique), Azar Louzi (LPSM)

#### **Research grants :**

- **2014-2017** : Referee (among 4) for the MITT PhD grant attribution

The board of the Doctoral School of Toulouse was involved in the selection of PhD grant applications, Post-Doc grant applications and the control of the choices of the PhD thesis committees.

- **2014-** : Referee for the FNRS grant attributions (PhD and Research projects)

Belgium national research agency

- **2012-2013** : Referee of French national research agency ANR grants.

- **2012** : Referee of CNRS interdisciplinary projects PEPS.

- **2009** : Referee Israel-USA Grants

#### **Referees for journals :**

##### Statistics and applied probability :

AOS (5), PTRF (2), EJS (8), ESAIM P & S (2), JSPI (3), Bernoulli (8), Annales de l'IHP (B) (2), J. of Mathematical Modelling and Analysis (1).

##### Signal processing journals:

IEEE : Trans. on Automatic and Control (1), IEEE : Trans. on Image Processing (1), IEEE : Transactions on KDD (1), IEEE :Trans. on Information Theory (3), Journal of mathematical imaging and vision (2),

##### Optimization journals :

Math. Oper. Research (2), Math. Prog B (2), Foundation and trends in Machine Learning (1), Automatica (1) SIAM J. on Control and Optimization (4), SIAM J. on Numerical Analysis (1)

##### Machine learning:

NIPS (3 years), COLT (2 years), Journal of Machine Learning Research (6)

### **III-4 Councils**

2023-: Scientific committee Position Professor: TSE

**2023-:** Scientific committee Position Junior chair: TSE

**2023-:** Scientific committee Position Professor: ICJ Saint Etienne, LPSM Paris

**2022-:** Scientific committee Position Associate Professor: LMO Orsay

**2021- :** Member of the bureau of the Doctoral School MITT

**2020- :** Member of the bureau of the Mathematic department of UT1

**2019 :** Scientific committee Position Associate Professor: Université Paul Sabatier

**2017 :** Scientific committee Position Associate Professor: Insa Toulouse.

**2014-2016 :** Scientific board doctoral School MITT (PhD grants, Post Doc Labex CIMI)

**2015 :** Scientific committee Position Associate Professor Versailles, Marseille, Toulouse I.

**2013-2014 :** Scientific board of “Groupe d’Avancement et primes Université Paul Sabatier”

**2012 :** Scientific committee Position Associate Professor: Marne la Vallée, Montpellier II, Toulouse I.

**2011-2014 :** Scientific Board of the “Institut of Mathématiques of Toulouse.”

**2011 :** Scientific committee Position Associate Professor IRIT - IMT

**2010 :** Scientific committee Position Associate Professor Montpellier II, ISFA – Lyon1

### **III – 5 Research duty:**

2021- : co - Responsible of the MADS research seminar (TSE)

2017- 2020 : Responsible of the MADS research team (TSE)  
<https://www.tse-fr.eu/fr/groups/mathematiques-de-la-decision-et-statistique>

2015-2016 : Responsible of the research seminar in statistics (TSE)  
<https://perso.math.univ-toulouse.fr/gadat/tse-statistical-seminar/>



## IV- Recent invited talks and research visits

I have been regularly invited to give research talks in generalist seminars of research teams in probability and statistics and to give more specific talks in national and international conferences.

### Workshops and conferences

**2022** : Machine learning and stochastic optimization (mini-course, invited keynote speaker, Univ. Angers)

**2019** : On stochastic averaging . Telecom Paristech

**2018** : On stochastic averaging . Ecole Polytechnique, Telecom Paristech

**2017**: Non-asymptotic Polyak Ruppert averaging without convexity, Saclay, PGM Days.

**2017** : *How to calculate the barycenter of a weighted graph* PDMP 2017, ANR PIECE, Paris, France.

**2014** : *L2-boosting on generalized Hoeffding decomposition for dependent variables* Pacific Rim Meeting (IMS - 2014), Taipei.

**2014** : *L2-boosting on generalized Hoeffding decomposition for dependent variables - application to sensitivity analysis*. In Proceedings of the SIAM Conference on Uncertainty Quantification (UQ14), Savannah, Georgia, 2014.

**2013** : *Shape invariant model, a bayesian point of view*. In Workshop on Bayes Non Parametric, Paris, France.

**2012** : *Bayesian consistency for deformable models in image processing*. 3th Conference of Mathematics for Image processing..

**2011** : *Assessment of an ionosphere storm occurrence risk*. Conference ENC GNSS, London, England.

**2011** : *Ionosphere severe storms and occurrence risk estimation*. 7th Conference Extreme Value Analysis, Probabilistic and Statistical Models and their Applications (EVA 2011), Lyon, France, 2011.

**2009** : Gns integrity achievement by using extreme value theory. In Proceedings of the 2009 Conference ION GNSS, San diego, USA, 2009.

### Seminars and talks

**05/2024**: Séminaire de l'ICJ Lyon

**05/2023** : Mobility AI – MEET – Aniti Days

**10/2021** : Fête de la science, TSE

**04/2019** : SPOT optimization seminar: On stochastic averaging

**10/2017** : Enac : How to calculate the barycenter of a weighted graph

**12/2017** : Univ. Paul Sabatier : Stochastic Heavy Ball and Polyak Ruppert averaging

**07/2017** : Univ. Bordeaux: IOPS 2017 Stochastic Heavy Ball and Polyak Ruppert averaging

**10/2016** : TSE : How to calculate the barycenter of a weighted graph

**05/2016** : Univ. Paul Sabatier: How to calculate the barycenter of a weighted graph

**04/2016** : SPOT optimization seminar: How to calculate the barycenter of a weighted graph

**01/2016** : Orsay-Inria : Regret of Narendra Schapiro bandit Algorithms

**09/2015** : MIAT INRA Toulouse: Regret of Narendra Schapiro bandit Algorithms

**06/2015** : SPOT optimization seminar: On stochastic efficiency of second order methods

**06/2015** : INRIA - Univ. Lille: Regret of Narendra Schapiro bandit Algorithms

**04/2015** : Univ. Oxford : Regret of Narendra Schapiro bandit Algorithms

**04/2015** : TSE : Regret of Narendra Schapiro bandit Algorithms

**02/2014** : CPTP (Inserm-CNRS) : Interdisciplinary mathematics with biology

**11/2013** : TSE: K nearest neighbour classification

**05/2013** : Statistical Seminar Orsay Bayesian estimation in deformable inverse problems

**02/2013** : Univ. Paul Sabatier: Active regression

**10/2012** : TSE : Bayesian estimation in deformable inverse problems

**02/2012** : Univ. Paul Sabatier: : Bayesian consistency

### Research visits

**2022**: 2 weeks department of Mathematics, Angers, F. Panloup.

**2021**: 1 week department of Mathematics, Lyon, Y. de Castro and C. Marteau.

**2021:** 1 week department of Mathematics, Angers, F. Panloup.  
**2021:** 1 week CIRM, A. Belotto, Marseille  
**2020:** Several weeks, E. Moulines, Ecole Polytechnique.  
**2017:** 1 week department of Mathematics, Angers, F. Panloup.  
**2017:** 2 weeks department of Mathematics, Lyon, C. Marteau.  
**06-2015:** Inria Lille, B. Guedj.  
**04-2015:** Department of Statistics, Oxford, A. Doucet.  
**2011:** 1 month Laboratoire de Mathématiques et Physique Théorique, Tours G. Barles.  
**2009 :** 2 months invited at Institute of Statistics, Bochum, H. Dette.  
**2008-2009 :** 5 months invited at Institut Camille Jordan, Lyon, C. Mercadier.

## V - Teaching and collective administration tasks

Below, I only describe the new courses I built « from scratch » in the last years.

### - Master's degree "Academic mathematics"

- 2016-2018 : CM - Master 2 Recherche Stochastic algorithms (36 HCM).

This course presents a general theory on stochastic algorithms : the Robbins-Monro result of almost sure convergence for stochastic gradient descent We then derive convergence rates in strongly convex situation and central limit theorems with the help of the infinitesimal generators. We also provide a new proof of deviation results of stochastic algorithms. We end with an introduction to simulated annealing procedures.

Lecture notes : 124 pages : [http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours\\_m2R1.pdf](http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours_m2R1.pdf)

Lecture notes : 88 pages : [http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours\\_Algo\\_Stos\\_M2R3.pdf](http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours_Algo_Stos_M2R3.pdf)

- 2015-2018 : CM - M1 - Advanced Analysis (30 HCM).

The objective of this lecture is to propose an introduction to functional analysis and in particular Hilbert spaces and Fixed point theorems. After around 15 hours of theory, I propose several applications in statistics (non parametric estimation, conditional expectation), probability (Brownian motion construction), optimization and economics (minimax theorem, game theory)

Lecture notes : 90 pages: [http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours\\_Analyse\\_M15.pdf](http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours_Analyse_M15.pdf)

- 2015-2018 : CM - M1 - Optimization on big data problems (15 HCM), practical sessions with Python.

The objective of this course is to introduce convex optimization problems and gradient descent methods. These methods are studied in various situation (convex or strongly convex cases). We also exemplify these methods on practical big data examples (Lasso algorithm with forward backward splitting). Finally, the course ends with an introduction to sequential stochastic methods like stochastic gradient descent.

Lecture notes : 60 pages : [http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours\\_Analyse\\_M16.pdf](http://perso.math.univ-toulouse.fr/gadat/files/2012/12/cours_Analyse_M16.pdf)

4 Python notebooks and 4 wikistat vignettes available on moodle.

- 2022-: CM - M1 – Probability and Statistics for Data Science (15 HCM).

The objective of this course is to introduce statistical models, estimators as well as sampling methods. I have completely modified the old school syllabus to push beyond basic concepts of statistics and drive students towards modern tools unavoidable for data science.

- 2023-: CM - M1 – Foundations on Machine Learning (15 HCM).

The objective of this course is to intensify the use of mathematics and statistics and introduce machine learning to Master students, in particular supervised classification.

### Professional Master's degree :

I actively contribute to the website <http://wikistat.fr/> that provides free teaching material for students and professors in datascience. In particular, I have written many slides for my M2 Big Data lecture that be downloaded here : <https://perso.math.univ-toulouse.fr/gadat/page-d-exemple/> I also supervised the students during their participation to big data challenges inside Toulouse and in a national French competition.

2014-2018 : Statistical Consulting M2 Stat-Eco (15 Htd)

- 2019-2021 : Lecture M2 : Mathematics of Machine and deep learning (18 Htd). Master 2 D3S.

- 2014-2018: Lecture M2 : Mathematics of Machine and Deep learning Algorithms (21 Htd). Master 2 « Statistiques et Econométrie » and then « Master in Mathematics and Economic Decision »  
Theoretical introduction, Practical session on computers. 10 wikistat vignettes and notebooks in Python/R available on moodle.
- 2014-2018: Lecture M2 Big Data (40 Htd). Master 2 Statistiques et Econométrie. Theoretical introduction, Practical session on computers with Python & R.
- Supervision of several case studies of students over the whole year with industrial partners (BVA, Airbus, etc)

### Professional bachelor :

- 2014-2016 : CM/TD - L1 Eco-Maths (100 Htd) Linear Algebra.
- 2014-2016 : CM : L3 Refresher course in mathematics (30 Htd). Magistère Economist and Statistician.  
[http://perso.math.univ-toulouse.fr/gadat/files/2014/10/cours\\_MAN\\_L3.pdf](http://perso.math.univ-toulouse.fr/gadat/files/2014/10/cours_MAN_L3.pdf)
- 2024-2025: CM : L3 Economie. Statistics

### Pedagogical duty :

- **2022-.**: Head of the M1 Eco Stat & D3S (TSE) (around 50 students)
- **2014-2017**: Head of the Magistère d' Economiste Statisticien (TSE) (around 90 students)  
<https://www.tse-fr.eu/fr/magistere-deconomiste-statisticien>
- **2013-2014**: joint with C. Besse. Conversion to a "CMI" of Master Pro IMAT. Now MAPI<sup>3</sup> (Université Paul Sabatier).

<http://departement-math.univ-tlse3.fr/master-mathematiques-appliquees-pour-l-ingenierie-l-industrie-et-l-innovation-mapi3--620692.kjsp?RH=1450190046833&RF=1455381160987>

- **2010**: Head of the "Masterisation de la Préparation à l'agrégation de mathématiques". Now transformed in M2 Pro Enseignement, speciality « Agrégation » (Université Paul Sabatier).
- **2009-2012**: Head of M2 Preparation "Agrégation de mathématiques" . 20-30 students / year, 20 teachers (Université Paul Sabatier). <https://www.math.univ-toulouse.fr/agreg/>

## VI - Publications

My publications may be downloaded on my website : <https://perso.math.univ-toulouse.fr/gadat/publications/>

1. Gadat, S. and Lalanne, C. Privately learning smooth distributions on the hypercube by projections, **ICML** (2024).
2. Crespo, M. and Gadat, S. and Gendre, X. Stochastic Langevin Monte Carlo for (weakly) log-concave posterior distributions, **Electronic Journal of Probability** (2024).
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15. S. Gadat, J. Kahn, C. Marteau, C. Maugis. Parameter recovery in two-component contamination mixtures: the L2 strategy **Annales de l'Institut Henri Poincaré (B)**, Volume 56, Number 2, 2020.
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2. (2023) Costa, M., Gadat, S., Gendre, X., Klein, T. Blackmirror: a stochastic algorithm for Sobol indices recovery, preprint.
3. (2023) De Castro, Y., Gadat, S., Marteau, C. Stochastic particle gradient descent optimization for supermix. submitted to Mathematical Programming.
4. (2023) Gadat, S., Villeneuve, S. Wasserstein Geometry of information retrieval. TSE Working Paper.