

Curriculum Vitae

Michael Grabchak

Department of Mathematics and Statistics
University of North Carolina Charlotte
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Academic Positions

- **UNC Charlotte**, Dept. of Mathematics and Statistics, Professor July 2022–Present
- **UNC Charlotte**, Dept. of Mathematics and Statistics, Associate Professor July 2017–June 2022
- **UNC Charlotte**, Dept. of Mathematics and Statistics, Assistant Professor Aug. 2011–June 2017
- **University of Copenhagen**, Dept. of Mathematics, Visiting Scientist Jan. 2009–June 2009

Education

- **Cornell University**, PhD in Statistics Aug. 2011
PhD Thesis: *Tempered Stable Distributions: Properties and Extensions*
Advisor: Gennady Samorodnitsky
Committee: Robert Jarrow, Sidney Resnick
- **Cornell University**, MS in Statistics Jan. 2008
MS Thesis: *Maximum Likelihood Estimation of Parametric Tempered Stable Distributions on the Real Line with Applications to Finance*
Advisor: Gennady Samorodnitsky
Committee: Robert Strawderman
- **Rutgers University**, BA in Mathematics and Computer Science (double major) May 2004
Graduated with Highest Honors

Publications

Submitted Papers:

- M. Grabchak and X. Zhang* (2024). On the small jumps of Lévy processes and the multivariate Dickman distribution. arXiv:2404.00239.

In Press:

- Y. Xia* and M. Grabchak (2024). Pricing multi-asset options with tempered stable distributions. To appear in *Financial Innovation*. <https://doi.org/10.1186/s40854-024-00649-9>.

Published Monograph (peer-reviewed):

1. M. Grabchak (2016). *Tempered Stable Distributions: Stochastic Models for Multiscale Processes*. Springer, Cham, Switzerland. 130 pages.

Edited Collections:

2. M. Grabchak, editor (2023). 50 Years of *Journal of Applied Statistics: Extreme Value Theory and its Applications in Finance*. Taylor and Francis, 15 articles. <https://www.tandfonline.com/journals/cjas20/collections/Extreme-Value-Theory>.

Journal Publications (peer-reviewed):

3. M. Grabchak and X. Zang* (2024). Representation and simulation of multivariate Dickman distributions and Vervaat perpetuities. *Statistics and Computing*, 34(1): Article 28.
4. J. Chang* and M. Grabchak (2023). Necessary and sufficient conditions for the asymptotic normality of higher order Turing estimators. *Bernoulli*, 29(4): 3369–3395.
5. M. Grabchak (2023). How do we perform a paired t -test when we don't know how to pair? *The American Statistician*, 77(2): 127–133.
6. M. Grabchak and P. Sabino (2023). Efficient simulation of p -tempered α -stable OU processes. *Statistics and Computing*, 33(1): Article 4.
7. E. Christou and M. Grabchak (2022). Risk estimation with composite quantile regression. *Econometrics and Statistics*, <https://doi.org/10.1016/j.ecosta.2022.04.004>.
8. M. Grabchak and I.M. Sonin (2022). A zero-one law for Markov chains. *Stochastics*, 94(5):680–697.
9. Y. Xia* and M. Grabchak (2022). Estimation and simulation for multivariate tempered stable distributions. *Journal of Statistical Computation and Simulation*, 92(3):451–475.
10. M. Grabchak (2022). Discrete tempered stable distributions. *Methodology and Computing in Applied Probability*, 24(3):1877–1890.
11. E. Christou and M. Grabchak (2022). Estimation of expected shortfall using quantile regression: A comparison study. *Computational Economics*, 60(2):725–753.
12. M. Grabchak, S.A. Molchanov, and V. Panov (2022). Around the infinite divisibility of the Dickman distribution and related topics. *Zapiski Nauchnykh Seminarov POMI*, 115:91–120.
13. M. Grabchak and E. Christou (2021). A note on calculating expected shortfall for discrete time stochastic volatility models. *Financial Innovation*, 7: Article 43.
14. M. Grabchak (2021). On the transition laws of p -tempered α -stable OU-processes. *Computational Statistics*, 36(2):1415–1436.
15. M. Grabchak (2021). An exact method for simulating rapidly decreasing tempered stable distributions. *Statistics & Probability Letters*, 170: Article 109015.
16. A. Mahzarnia*, M. Grabchak, and J. Jiang (2021). Estimation of the minimum probability of a multinomial distribution. *Journal of Statistical Theory and Practice*, 15(2): Article 24.
17. M. Grabchak (2020). On the simulation of general tempered stable Ornstein-Uhlenbeck processes. *Journal of Statistical Computation and Simulation*, 90(6):1057–1081.
18. M. Grabchak, M. Kelbert, and Q. Paris (2020). On the occupancy problem for a regime switching model. *Journal of Applied Probability*, 57(1):53–77.
19. M. Grabchak (2019). Rejection sampling for tempered Lévy processes. *Statistics and Computing*, 29(3):549–558.
20. E. Christou and M. Grabchak (2019). Estimation of value-at-risk using single index quantile regression. *Journal of Applied Statistics*, 46(13):2418–2433.
21. M. Grabchak and S.A. Molchanov (2019). Limit theorems for random exponentials: The bounded support case. *Theory of Probability and its Applications*, 63(4):634–647. (Also printed in *Teoriya Veroyatnostei i ee Primeneniya*, 63(4):779–794.)

22. M. Grabchak and S.A. Molchanov (2019). The alloy model: Phase transitions and diagrams for a random energy model with mixtures. *Markov Processes and Related Fields*, 25(4):591–613.
23. G. Decrouez, M. Grabchak, and Q. Paris (2018). Finite sample properties of the mean occupancy counts and probabilities. *Bernoulli*, 24(3):1910–1941.
24. M. Grabchak (2018). Domains of attraction for positive and discrete tempered stable distributions. *Journal of Applied Probability*, 55(1):30–42.
25. M. Grabchak and Z. Zhang (2018). Asymptotic normality for plug-in estimators of diversity indices on countable alphabets. *Journal of Nonparametric Statistics*, 30(3):774–795.
26. C. Chen*, M. Grabchak, A. Stewart*, J. Zhang*, and Z. Zhang (2018). Normal laws for two entropy estimators on infinite alphabets. *Entropy*, 20(5), 371.
27. M. Grabchak, L. Cao, and Z. Zhang (2018). Authorship attribution using diversity profiles. *Journal of Quantitative Linguistics*, 25(2):142–155.
28. M. Grabchak (2018). A random variable that does not belong to a domain of attraction, but its absolute value does. *The Mathematical Scientist*, 43(1):56–59.
29. M. Grabchak and Z. Zhang (2017). Asymptotic properties of Turing’s formula in relative error. *Machine Learning*, 106(11):1771–1785.
30. M. Grabchak, E. Marcon, G. Lang, and Z. Zhang (2017). The generalized Simpson’s entropy is a measure of biodiversity. *PLOS ONE*, 12(3):e0173305. DOI:10.1371/journal.pone.0173305
31. M. Grabchak (2017). A simple condition for the multivariate CLT and the attraction to the Gaussian of Lévy processes at long and short times. *Communications in Statistics – Theory and Methods*, 46(1):446–456.
32. M. Grabchak and V. Cosme** (2017). On the performance of Turing’s formula: A simulation study. *Communications in Statistics – Simulation and Computation*, 46(6):4199–4209.
33. Z. Zhang and M. Grabchak (2016). Entropic representation and estimation of diversity indices. *Journal of Nonparametric Statistics*, 28(3):563–575.
34. M. Grabchak (2016). On the consistency of the MLE for Ornstein-Uhlenbeck and other selfdecomposable processes. *Statistical Inference for Stochastic Processes*, 19(1):29–50.
35. M. Grabchak (2015). Inversions of Lévy measures and the relation between long and short time behavior of Lévy processes. *Journal of Theoretical Probability*, 28(1):184–197.
36. M. Grabchak (2015). Three upsilon transforms related to tempered stable distributions. *Electronic Communications in Probability*, 20(82):1–10.
37. M. Grabchak and S. Molchanov (2015). Limit theorems and phase transitions for two models of summation of iid random variables depending on a parameter. *Theory of Probability and its Applications*, 59(2):222–243. (Also printed in *Teoriya Veroyatnostei i ee Primeneniya*, 59(2):340–364.)
38. Z. Zhang and M. Grabchak (2014). Nonparametric estimation of Küllback-Leibler divergence. *Neural Computation*, 26(11):2570–2593.
39. M. Grabchak (2014). Does Value-at-Risk encourage diversification when losses follow tempered stable or more general Lévy processes? *Annals of Finance*, 10(4):553–568.
40. M. Grabchak, Z. Zhang, and D. T. Zhang (2013). Authorship attribution using entropy. *Journal of Quantitative Linguistics*, 20(4):301–313.

41. Z. Zhang and M. Grabchak (2013). Bias adjustment for a nonparametric entropy estimator. *Entropy*, 15(6):1999–2011.
42. M. Grabchak (2012). On a new class of tempered stable distributions: Moments and regular variation. *Journal of Applied Probability*, 49(4):1015–1035.
43. M. Grabchak and G. Samorodnitsky (2010). Do financial returns have finite or infinite variance? A paradox and an explanation. *Quantitative Finance*, 10(8):883–893.

Conference and Miscellaneous Publications (peer-reviewed):

44. L. Cao and M. Grabchak (2023). Experience report on using WeBWorK in teaching discrete mathematics. *SIGCSE 2023: Proceedings of the 54th ACM Technical Symposium on Computer Science Education V.1*, pg. 861–867.
45. W. Misenheimer** and M. Grabchak (2021). A simple model for predicting winners of NFL football games. *The Pi Mu Epsilon Journal*, 15(4):205–214.
46. L. Cao and M. Grabchak (2019). Interactive preparatory work in a flipped programming course. *CompEd '19: Proceedings of the ACM Conference on Global Computing Education*, pg. 229–235
47. L. Cao and M. Grabchak (2014). Smoothly truncated Levy walks: Toward a realistic mobility model. *IPCCC '14: Proceedings of the 33rd International Performance Computing and Communications Conference*. DOI: 10.1109/PCCC.2014.7017071.
48. M. Grabchak and S. Molchanov (2013). Limit theorems and phase transitions for two models of summation of iid random variables depending on parameters. *Doklady Mathematics*, 88(1):431–434. (Russian translation in *Doklady Akademii Nauk*, 451(4):374–377.)
49. M. Grabchak, N. Bhamidipati, R. Bhatt, and D. Garg (2011). Adaptive policies for selecting Groupon style chunked reward ads in a stochastic knapsack framework. *WWW '11: Proceedings of the 20th International Conference on World Wide Web*, pg. 167–176.

Technical Reports (not peer-reviewed)

- M. Grabchak (2012). Limit theorems for sequences of tempered stable and related distributions. <http://arxiv.org/abs/1201.6006>. 17 pages.

Scientific Software

- M. Grabchak and L. Cao (2023). SubTS: Positive tempered stable distributions and related subordinators. Ver. 1.0, R Package. <https://CRAN.R-project.org/package=SubTS>.
- M. Grabchak and L. Cao (2017). SymTS: Symmetric tempered stable distributions. Ver. 1.0, R Package. <https://CRAN.R-project.org/package=SymTS>. (Update: Version 1.0-2, 2023).
- L. Cao and M. Grabchak (2015). EntropyEstimation: Estimation of entropy and related quantities. Ver. 1.2, R Package. <https://CRAN.R-project.org/package=EntropyEstimation>.

Professional Activities

- Associate Editor: *Journal of Applied Statistics*
- Refereed for: *Acta Applicandae Mathematicae*, *ALEA: Latin American Journal of Probability and Mathematical Statistics*, *The American Statistician*, *Brazilian Journal of Probability and Statistics*, *Communications in Statistics – Simulation and Computation*, *Communications in Statistics – Theory and Methods*, *Computational Statistics*, *Computational Statistics & Data Analysis*, *Digital Scholarship in the Humanities*, *Electronic Journal of Statistics*, *Entropy*, *Financial Innovation*, *Heliyon*, *Journal of Applied Statistics*, *Journal of Econometrics*, *Journal of Quantitative Linguistics*, *Journal of Statistical Computation and Simulation*, *Journal of Taibah University for Science*, *Journal of Theoretical Probability*, *Kredit und Kapital*, *Mathematics*, *Nonlinear Dynamics*, *PLOS One*, *SIAM Journal of Financial Mathematics*, *Statistical Applications in Genetics and Molecular Biology*, *Statistical Inference for Stochastic Processes*, *Statistical Papers*, *Statistics and Computing*, *Statistics and Probability Letters*, *Stochastic Processes and Their Applications*, *Symmetry*, *WIREs Computational Statistics*

Teaching

- **UNC Charlotte**, Instructor 2011-Present
Graduate Courses: Theory of Probability I (MATH 8120, PhD level), Applied Probability I (MATH 5128, Masters level), Theory of Statistics I (MATH 5126, Masters level)
Undergraduate courses: Risk Theory (MATH 4128), Probability and Stochastic Models (MATH 4122), Probability and Statistics I and II (MATH/STAT 3122-3123), Probability and Statistics For Engineers (STAT 3128), Linear Algebra (MATH 2164), Introduction to Probability and Statistics (STAT 2122)
- **University of Copenhagen**, Instructor Spring 2009
Courses: Statistics and Finance (Masters Level)
- **Cornell University**, Instructor 2008-2009
Courses: Introduction to Statistics, Calculus I

Special Invited Mini-Courses

- Taught the advanced topics course entitled “Topics in Applied Probability: Tempered Stable Distributions, Ad Placement, and Turing’s Formula.” A 15-hour course, October 6-17, 2014, Higher School of Economics in Moscow, Russia. Organized by the Laboratory of Stochastic Analysis and its Applications.

Participation in Scientific Conferences

Invited Talks:

1. AMS Spring Southeastern Sectional Meeting, March 2023
Atlanta, GA
2. SIAM Conference on Financial Mathematics and Engineering 2021, Jun. 2021
Philadelphia, PA (Online due to COVID-19)
3. Laboratory of Stochastic Analysis and its Applications Autumn Meeting–2020, Oct. 2020
Moscow, Russia (Online due to COVID-19)

4. Laboratory of Stochastic Analysis and its Applications Winter Meeting–2017, Dec. 2017
Moscow, Russia
5. Heavy Tails and Long Range Dependence: A Conference in honor of Gennady Samorodnitsky’s 60th birthday, Paris, France Jun. 2017
6. International Workshop on Applied Probability (IWAP) 2016, Jun. 2016
Toronto, Canada
7. XVII April International Academic Conference on Economic and Social Development, Apr. 2016
Moscow, Russia
8. The 18th INFORMS Applied Probability Society Conference, Jul. 2015
Istanbul, Turkey
9. AMS Joint Mathematics Meetings, Jan. 2015
San Antonio, TX
10. “Stochastics, Statistics, Financial Mathematics,” a conference in honor of Professor Albert Shiryaev’s 80th anniversary, Oct. 2014
Moscow, Russia
11. AMS Southeastern Spring Sectional Meeting, Mar. 2014
Knoxville, TN
12. AMS Joint Mathematics Meetings, Jan. 2014
Baltimore, MD
13. The 17th INFORMS Applied Probability Society Conference, Jul. 2013
San Jose, Costa Rica
14. 10th International Vilnius Conference on Probability Theory and Mathematical Statistics, Jun. 2010
Vilnius, Lithuania

Contributed Talks:

15. 40th Conference on Stochastic Processes and their Applications, Jun. 2018
Gothenburg, Sweden
16. 10th Extreme Value Analysis Conference, Jul. 2017
Delft, Netherlands
17. 8th World Congress on Probability and Statistics, Jul. 2012
Istanbul, Turkey
18. Risk Analysis in Economics and Finance Conference, Feb. 2011
CIMAT, University of Guanajuato

Colloquium Talks

Scientific Talks:

1. Spring Statistics Seminar Series, Mississippi State University March 2023
2. Probability and Stochastic Processes Seminar, University of Tennessee Knoxville Sept. 2021
3. United Seminar of the Department of Probability at Lomonosov Moscow State University Apr. 2021

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| 4. Biodiversity Informatics Global Webinar | Sept. 2017 |
| 5. Mathematical Methods in Finance Seminar, Instituto Nacional de Matemática Pura e Aplicada (IMPA) | Aug. 2015 |
| 6. Probability Seminar, Duke University | Mar. 2013 |
| 7. Virginia Military Institute (VMI) | Oct. 2012 |
| 8. Bangalore Probability Seminar, Indian Institute of Science | Jul. 2012 |
| 9. Indian Statistical Institute, Delhi | Jun. 2012 |
| 10. Risk Management Seminar, Belk Business School, UNC Charlotte | Feb. 2012 |
| 11. Departmental Colloquium, Department of Mathematics and Statistics American University, Washington DC | Oct. 2011 |
| 12. Bangalore Probability Seminar, Indian Institute of Science | Jul. 2010 |
| 13. Department of Biostatistics, University of Buffalo | Mar. 2010 |
| 14. Department of Mathematical Science, University of Copenhagen | May 2009 |

Talks for Undergraduates:

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| 15. STEM Seminar Series at Fayetteville State University | Mar. 2012 |
| 16. Induction ceremony for UNCC's branch of Pi-Mu-Epsilon (a math honors society) | Feb. 2012 |

Industry Experience

- **Yahoo! Labs**, Intern Summer 2010
 Developed several algorithms for solving certain novel versions of the stochastic knapsack and the multi-armed bandit problems. These are of interest in ad selection for internet advertising.
- **IBM Research**, Intern Summer 2007
 As part of the statistical analysis and forecasting group, I worked on a revenue forecasting project.
- **Rutgers University Learning Centers**, Programmer/Web Designer 2003-2004
 Designed and implemented a website for scheduling one-on-one tutoring sessions.