Leandro Sánchez-Betancourt

Curriculum vitae

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Academic appointments

2021–present **Research Associate**, *Department of Mathematics, Imperial College London*, Mathematical Finance research group.

2019–2021 **Graduate Teaching and Research Scholar**, *Oriel College, Oxford*.

Education

2017–2021 **DPhil in Mathematics**
University of Oxford, Mathematical Institute.
Uncertain execution in order-driven markets.
Supervisor: Professor Álvaro Cartea.

2016–2017 **MSc in Financial Mathematics**
King's College London, Department of Mathematics.
Disertation: Stochastic control for optimal dynamic trading strategies.
Overall mark: Distinction (94/100).
Prize: *Best overall performance student award*.

2010–2014 **BSc in Actuarial Sciences**
Universidad Nacional Autónoma de México, Facultad de Ciencias.
Overall mark: 10/10.
Prize: *Gabino Barreda Medal* (for top student).

Awards, accomplishments, and scholarships

2021–2022 Co-investigator in the AFM-ATI collaboration. Funding for the project: £ 200,000.

2019–2021 Graduate Teaching and Research Scholar in Mathematics, Oriel College, Oxford.

2019 Winner of the Financial Mathematics Team Challenge, Rio de Janeiro, Brazil.

2018–2021 Scholarship for doctoral studies at Oxford, awarded by Consejo Nacional de Ciencia y Tecnología, México (CONACyT).

2017–2020 Mathematical Finance Scholarship, awarded by the Mathematical Institute, Oxford.

2017 **Best overall performance student award**, for the highest marks in the MSc in Financial Mathematics, Department of Mathematics, King's College London.

2016 Scholarship for graduate studies at King's College London, awarded by CONACyT.

2016 Scholarship for graduate studies at King's College London, awarded by Secretaría de Educación Pública, México (SEP).

2016 **Gabino Barreda medal**, for top student in four-year undergraduate program, awarded by Universidad Nacional Autónoma de México (UNAM).

2011/12/13 Excellence Scholarship, awarded by SEP.

2008/09 Winner of the Mathematical Olympiad of México, at state level.

2007/08/09 Winner of the Mathematical Competition, over all schools of UNAM.

2004/05 Winner of the Mathematical Olympiad of Cuba, at national level.

Publications* and submitted* papers

⋆ M. Forde, L. Sánchez-Betancourt and B. Smith (2021). *Optimal Trade Execution for Gaussian Signals with Power-law Resilience*. Quantitative Finance (to appear)

⋆ G. Bouzianis, L. P. Hughston, S. Jaimungal and L. Sánchez-Betancourt (2021). *Lévy-Ito Models in Finance.* Probability Surveys **18**, 132-178.

⋆ Á. Cartea, S. Jaimungal and L. Sánchez-Betancourt (2021). *Deep Reinforcement Learning for Algorithmic Trading*. In Machine Learning in Financial Markets: A guide to contemporary practices (to appear). Edited by C.-A. Lehalle and A. Capponni. Cambridge University Press.

⋆ Á. Cartea and L. Sánchez-Betancourt (2021). *The Shadow Price of Latency: Improving Intraday Fill Ratios in Foreign Exchange Markets*. SIAM Journal on Financial Mathematics **12** (1), 254–294.

⋆ L. P. Hughston and L. Sánchez-Betancourt (2020). *Pricing with Variance Gamma Information*. Risks **8** (4), 105:1-22.

∗ Á. Cartea, I. Perez Arribas and L. Sánchez-Betancourt (2020). *Optimal Execution of Foreign Securities: A Double-Execution Problem with Signatures and Machine Learning*.

∗ Á. Cartea, S. Jaimungal and L. Sánchez-Betancourt (2019) *Latency and Liquidity Risk.*

∗ Á. Cartea and L. Sánchez-Betancourt (2021). *Optimal Execution with Stochastic Delay.*

Industry experience

2017–present **Research intern**, *LMAX Exchange*, London.
Researcher in topics regarding latency, high-frequency trading, and FX trading.
Micro-structure comparison between trading-on-firm venues against those with last look.

2015–2016 **Consultant**, *Indra Business Consulting*, Mexico City.
Mathematical support for migration of Santander's risk-management platform.
Analysis of methodological changes in derivative pricing in Murex.

2014–2015 **Risk analyst**, *Citigroup*, Mexico City.
Development of internal Debt Rating Model in collaboration with Citigroup New York.
Responsible for monthly calculations of the regulatory reserves.

Teaching experience

2019–present **Graduate Teaching and Research Scholar**, *Oriel College, Oxford*.
- Probability, Probability prelims (Michaelmas term 2019, 2020)
- Integration, Statistics, Integral transforms (Hillary term 2020, 2021)
- Statistics and data analysis (Trinity term 2020, 2021)

2018-2019 **Teaching appointments**, *Queen's College, Oxford*.
- Probability (Michaelmas term 2018)
- Statistics and data analysis (Trinity term 2019)

2018-2021 **Tutor**, *Mathematical Institute, University of Oxford*.
Graduate courses:
- Algorithmic trading, Asset pricing, Stochastic control, Market micro-structure.

2018-2021 **Teaching assistant**, *Mathematical Institute, University of Oxford*.
Graduate courses:
- Stochastic control, Market micro-structure, Algorithmic trading, Asset pricing.

Undergraduate courses:
- Stochastic differential equations, Mathematical models for financial derivatives.

Jul 2016 **Diplomat lecturer**, *Universidad Marista*, Mexico City.
Lecturer for "Diplomat of Financial Derivatives", Equity, FX and commodity derivatives module.

Jul 2015 **Diplomat lecturer**, *Universidad Marista*, Mexico City.
Lecturer for "Diplomat of Financial Risks", Market risk module.

2014–2016 **Lecturer**, *Universidad Marista*, Mexico City.
Undergraduate lecturer position:
- Stochastic processes, Statistics, Probability.

Languages

Spanish **Native speaker**

English **Fluent**

Academic visits, team projects, and outreach

Jul 2019 **Financial Mathematics Team Challenge, Rio de Janeiro, Brazil**.
Team project: Hedging derivatives with price impact. Mentor: Dr Ryan Donnelly.
My role was that of team leader in this outreach project. Our team won the competition.

Jun 2019 **Fields-China Joint Industrial Problem Solving Workshop in Finance, Fields Institute, Toronto**.
Team project: Deep Machine Learning and Volatility Prediction.

Jun 2018 **Academic visit to University of Toronto, Ontario, Canada.**
Collaboration with Professor Sebastian Jaimungal.

2018–2020 **Christopher Hatton School, London**.
I led a weekly Math Club meeting for two years. I coached the students on Mathematical Olympiad problems for their age group.

Presentations made at conferences, seminars, and summer schools

Jun 2021 **Big Data and Machine Learning in Finance Conference, Politecnico di Milano**.
Presentation given (online): Optimal Execution of Foreign Securities: A Double Execution Problem with Signatures and Machine Learning.

Jun 2021 **SIAM Conference on Financial Mathematics**.
Presentation given (online): Optimal Execution with Stochastic Delay.

Feb 2021 **IEOR seminar, Berkeley**.
Presentation given: Latency in Order-Driven Markets.

Oct 2020 **Mathematical Finance Internal Seminar, University of Oxford**.
Presentation given: Optimal Execution with Stochastic Delay.

Oct 2019 **21st Actuarial Congress: "A Model to Follow", Universidad Marista, Mexico City**.
Presentation given: Latency in Electronic Markets.

Sep 2019 **12th European Summer School on Financial Mathematics, Padova**.
Presentation given: Optimal Order Placement with Random Measures.

Jun 2019 **SIAM Conference on Financial Mathematics, Toronto**.
Presentation given: Optimal Order Placement with Random Measures.

Mar 2019 **1st Oxford-ETH Workshop on Financial Mathematics, Oxford**.
Presentation given: Optimal Order Placement with Random Measures.

Aug 2018 **11th European Summer School on Financial Mathematics, Paris**.
Presentation given: Maximizing Fill Ratios in FX Markets with Latency, Volatility and Model Ambiguity.

Jul 2018 **10th World Congress of the Bachelier Finance Society, Dublin**.
Presentation given: Maximizing Fill Ratios in FX Markets with Latency, Volatility and Model Ambiguity.

May 2018 **Actuarial Sciences Conference, Universidad Marista, México City**.
Presentation given: The Shadow Price of Latency.

May 2018 **Mathematical Finance Internal Seminar, University of Oxford**.
Presentation given: The Shadow Price of Latency.

Jan 2018 **Market Microstructure, Imperial-CFM workshop, London**.
Poster presentation: Overcoming Latency in the Targeting of Fill Ratios.

Dec 2017 **LMAX Seminar, London**.
Presentation given: Overcoming Latency in the Targeting of Fill Ratios.

References

1. **Professor Álvaro Cartea**.
The Mathematical Institute, Oxford OX2 6GG, United Kingdom.
alvaro.cartea@maths.ox.ac.uk

2. **Professor Samuel N. Cohen**.
The Mathematical Institute, Oxford OX2 6GG, United Kingdom.
samuel.cohen@maths.ox.ac.uk

3. **Professor Lane P. Hughston**.
Department of Computing, Goldsmiths University of London,
New Cross, London SE14 6NW, United Kingdom.
l.hughston@gold.ac.uk

4. **Professor Sebastian Jaimungal**.
Department of Statistical Sciences, University of Toronto,
Toronto, Ontario M5T 1P5, Canada.
sebastian.jaimungal@utoronto.ca