

Gianluca Covini

PhD Student in Statistics and Computer Science
Bocconi University

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Academic Background

Education

2025 2030	PhD in Statistics and Computer Science, Bocconi University, Milan, Italy ○ Advisor: Prof. Hugo Lavenant. ○ Current research topics: entropic optimal transport, variational methods. ○ Selected PhD coursework (GPA: A): Measure Theory and Optimal Transport; Probability Theory and Stochastic Processes; Statistical Theory; Theoretical Computer Science and Programming.
2022 2025	MSc in Mathematics, University of Pavia, Pavia, Italy, 110/110 cum laude; GPA: 29.5/30 ○ Selected coursework: Functional Analysis; Advanced Probability; Stochastic Processes; Foundations of Geometry; Mathematical Finance; Econometrics; Machine Learning; Finite Element Method; Dynamical Systems. ○ Additional coursework attended beyond the curriculum: Advanced Functional Analysis; Evolution Equations; Calculus of Variations. ○ Master's thesis: <i>Dynamic Parameter Policies for Leading Ones on Enhanced State Spaces</i>, supervised by Prof. Carola Doerr (Sorbonne Université/CNRS) and Prof. Stefano Gualandi (University of Pavia).
2022 2024	Student of the Merit-Based Programme, Almo Collegio Borromeo, Pavia, Italy ○ Courses attended: Optimal Transport for Optimization; Fuzzy Logic; Introduction to Stochastic Differential Equations; Quantitative Methods for Art. ○ Co-organized courses: Machine Learning for Healthcare Management; Seminar Series in Mathematics. ○ Reading groups: Hausdorff Measure and Fractals; Laplacian Eigenvalues, supervised by Prof. Dario Mazzoleni.
2019 2022	BSc in Mathematics, University of Pavia, Pavia, Italy, 110/110 cum laude; GPA: 29.8/30 ○ Selected coursework: Mathematical Analysis; Linear Algebra; Algebra; Geometry; Probability; Mathematical Statistics; Numerical Analysis; Optimization; Data Analysis. ○ Bachelor's thesis: <i>Ewens Sampling Formula and its Applications to the Study of Population Biodiversity</i>, supervised by Prof. Emanuele Dolera.

Teaching Experience

- 10/2021 – **Academic Tutor**, *University of Pavia*, Pavia, Italy
09/2025 Teaching assistant for Calculus in the Engineering Bachelor's program and Probability in the Artificial Intelligence and Mathematics Bachelor's programs. Supervisors: Prof. Elisabetta Rocca, Prof. Abramo Agosti, Prof. Emanuele Dolera, and Prof. Carlo Orrieri.
- 10/2023 – **Lecturer – Advanced Computational Statistics**, *Almo Collegio Borromeo*,
12/2023 Pavia, Italy
Designed and taught the course *Advanced Computational Statistics*, covering theory and applications to real-world data in R. Supervisor: Prof. Emanuele Dolera.

Advanced Schools and Training

- 2026 **Jul Causality and Graphical Models Summer School**, *Bocconi–StatML*, Como, Italy.
May Mathematical Foundations of Machine Learning, *CIRM, Vason, Italy*. Dynamics, geometry, and theoretical guarantees for neural networks and statistical models from an analytical perspective.
- 2025 **Jul Summer School in Analysis and Machine Learning**, *Festum Pi, Chania, Greece*. Kinetic theory, stability of optimal transport, and diffusion models.
Jun Theoretical Foundations of Machine Learning, *MaLGa Center, University of Genoa, Genoa, Italy*. Statistical learning theory, kernel methods, neural networks, optimization, RKHS, convex analysis, and generalization.
Apr Computational Optimal Transport and Missing Values, *Bocconi–StatML, Windsor, UK*. Computational optimal transport (Gabriel Peyré) and statistical learning with missing values.
- 2024 **Dec PhD Winter School on Advanced Stochastic Optimization**, *NTNU, Trondheim, Norway*. Mixed-integer stochastic programming, decision-making under uncertainty, distributionally robust optimization, and stochastic dual dynamic programming.
Jun 2nd Copenhagen PhD School of Stochastic Programming, *University of Copenhagen, Copenhagen, Denmark*. Stochastic programming, multistage models, bounding techniques, scenario generation, and decision-dependent uncertainty.
- 2020 **Sep Intensive School in Data Science**, *ISAGS, University of Pavia, Pavia, Italy*. Machine learning and applications in chemistry, genomics, and neuroscience.

Research

Research Interests

I am interested in **optimal transport**, especially in the use of tools from *calculus of variations*, *gradient flows* and *differential geometry* to study problems arising in statistics, optimization, and machine learning.

Current Research Projects

- *Sinkhorn Propagation on Graphs*, joint with Hugo Lavenant (Bocconi University). We study a variational propagation problem on graphs involving Sinkhorn divergences, using variational methods, gradient-flow formulations, and numerical algorithms.
- *Bayes Rule via Entropic Approximation of the Knothe–Rosenblatt Rearrangement*, joint with Carlo Ciliberto (UCL) and Giulia Luise (UCL/Microsoft Research). We study entropic approximations of the Knothe–Rosenblatt rearrangement for posterior sampling in Bayesian inference.

Publications and Preprints

- [1] Gianluca Covini, Denis Antipov, Carola Doerr. *Enhancing Parameter Control Policies with State Information*. Proceedings of the Foundations of Genetic Algorithms (FOGA 2025), Leiden, Netherlands, 2025. arXiv:2507.08368.

Talks and Presentations

- Feb 2025 **Conference Presentation**, *ROADEF 2025 – Conference of the French Operations Research Society*, Champs-sur-Marne, France
Presented master's thesis research on dynamic parameter policies for randomized local search on the LeadingOnes problem. Abstract published in the ROADEF 2025 Book of Abstracts.
- Jan 2025 **Seminar Talk**, *WIAS Berlin, Seminar Series "Modern Methods in Applied Stochastics and Nonparametric Statistics"*, Online
Presented the paper by Lambert et al., *Variational Inference via Wasserstein Gradient Flows*, in a public seminar of the WIAS research group Stochastic Algorithms and Nonparametric Statistics as part of a PhD interview process.

Software

SlicedWasserstein.jl, a registered Julia package for sliced Wasserstein distances. Author and maintainer.

Undergraduate Research Experience

- 10/2024 – **Survey on Distributionally Robust Optimization**, *Remote collaboration*
12/2024
 - Informal collaboration on *submodular functions for distributionally robust optimization*.
 - **Supervisors:** Prof. Angelos Georghiou (University of Cyprus) and Prof. Rosario Paradiso (VU Amsterdam).
 - **Outcome:** survey report.
- 07/2024 – **Statistics Summer Research Intern**, *Statistical Laboratory, University of Cambridge*, Cambridge, UK
08/2024
 - Worked on the study of statistical properties of stochastic optimization problems, in the context of causal statistics.
 - **Supervisors:** Prof. Qingyuan Zhao and Tobias Freidling.
 - **Outcome:** research report.
- 03/2024 – **Research Intern in Operations Research**, *LIP6 – Sorbonne Université/CNRS*, Paris, France
09/2024
 - Conducted research on dynamic algorithm configuration, developing optimal parameter policies for genetic algorithms.
 - **Supervisor:** Prof. Carola Doerr.
 - **Outcomes:** Master's thesis; conference paper.
- 08/2023 – **Machine Learning Researcher**, *Sphaera*, Hybrid
03/2024
 - Developed a player-tracking algorithm for five-a-side football using computer vision and deep-learning tools.
 - **Supervisors:** Dr. Mirko Messori and Dr. Giuseppe Roberto Marseglia.
 - **Outcome:** research report; the resulting implementation is proprietary.

Recognition

Scholarships, Honors and Awards

- 2024–2026 **Selected funded participation** in advanced schools and workshops, including Mathematical Foundations of Machine Learning by CIRM, StatML – Bocconi Spring School, Festum Pi, Applied Mathematics School at KAUST, PhD School in Stochastic Programming at the University of Copenhagen.
- 2025 **Full PhD Scholarship**, Bocconi University.
- 2024 **Merit-Based Scholarship**, Associazione Alunni Almo Collegio Borromeo.
- 2024 **Fully funded research stay**, Corpus Christi College, University of Cambridge.
- 2024 **Erasmus+ Traineeship Grant** for research internship at LIP6, Sorbonne Université/CNRS, Paris.
- 2024 **Research residence**, Maison de l'Italie, Cité Internationale Universitaire de Paris.

Certifications

Oct 2024 **TOEFL iBT 106/120 (C1)**, ETS.
Oct 2024 **GRE General Test**, ETS: Quantitative 168, Verbal 162.
Additional certifications: Getting Started with Deep Learning (NVIDIA, 2023); IBM Data Science (Coursera, 2021); DELF B1 (Ministère de l'Éducation Nationale, 2016).

Skills

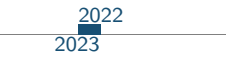
Languages

Italian	Native	
English	C1	TOEFL iBT 106/120.
French	B1	DELF B1.

Computer Skills

Programming	Python, Julia, R, MATLAB	Scientific computing	NumPy, Pandas, PyTorch, OpenCV, Matplotlib
Optimization	Pyomo, Gurobi, CPLEX	Tools	Git, L ^A T _E X, Linux, basic HPC usage
Other	Multiprocessing, Excel, WordPress	Cloud	Basic AWS usage

Service and Additional Experience

	Member of the Scientific Committee , <i>Associazione Alumni Taramelli</i> Served on the scientific committee of a project for secondary-school students.
	Auditor & Data Analyst , <i>JE Italy</i> Monitored and analyzed confederation data; provided audit consulting services for junior enterprises.
	IT Consultant , <i>JECO Pavia</i> , Pavia, Italy Data management and digitalization projects for SMEs. As <i>Head of IT</i> (Sep 2021 – Oct 2022), managed area members and annual strategy planning using OKRs.
	Volunteer , <i>Sant'Egidio – Youth for Peace</i> , Pavia, Italy Organized recreational activities for children in difficult situations and activities aimed at countering school dropout.
	Activity Manager , <i>Entrepreneurship Club Pavia</i> , Pavia, Italy Organized public events with entrepreneurs and start-up founders; managed internal activities.
	Co-Founder and Board Member , <i>The Most Maiorum</i> , Pavia, Italy Organized cultural and charity events.