Francesco Mascari

he/him | PhD Student

✉ francesco.mascari@phd.unibocconi.it • francescomascari.github.io

in francesco-mascari

I am currently working as a PhD student in Statistics and Computer Science at Bocconi University in Milan. My main research interests are Bayesian Nonparametrics, Reproducing Kernel Hilbert Spaces, Wasserstein Distance, and Random Measures.

Education

PhD in Statistics and Computer Science — **2021 – ongoing**
Bocconi University, Milan, Italy

MSc in Mathematics for Life and Data Sciences, cum laude — **2018 – 2021**
University of Trento, Trento, Italy

BSc in Mathematics, cum laude — **2015 – 2018**
University of Bologna, Bologna, Italy

High School Diploma in Scientific Studies, cum laude — **2010 – 2015**
Liceo Scientifico Copernico, Bologna, Italy

PhD Research Project

Title: *Measuring Dependence in Partial Exchangeable Setting with Reproducing Kernel Hilbert Spaces*

Advisor: Prof. Hugo Lavenant, *Bocconi University*

Co-advisor: Prof. Marta Catalano, *Luiss University*

Abstract: We aim to apply the theory of Reproducing Kernel Hilbert Spaces to measure the level of borrowing of information in a partially exchangeable model with two groups. Moreover, we seek applicability both a priori and a posteriori, while preserving numerical tractability.

MSc Thesis

Title: *A Micro-macro Connection: The Valuable Relation between Large Deviations for Diffusion Processes and Wasserstein Gradient Flows*

Supervisors: Prof. Carlo Orrieri, *University of Pavia*; Dr. Giovanni Conforti, *École Polytechnique*

Abstract: This work aims to present the passage from the microscopic stochastic description of a system of particles to its macroscopic description as a Fokker-Planck equation. After a brief introduction to some basics in Convex Analysis and Measure Theory, a complete review of optimal transport and Wasserstein metric, on the one hand, and of large deviations for path measures of diffusion processes, on the other, is displayed. A thorough description of the gradient flow formulation for the Fokker-Planck equation is then analyzed with a particular interest in the JKO functional, which is shown to be equivalent in Γ-convergence to the rate functional arising in the large deviation principle for a system of independent Brownian particles.

Ongoing Research Projects

Measuring Dependence under Partial Exchangeability with Reproducing Kernel Hilbert Spaces
with M. Catalano and H. Lavenant

Exchange and Visiting Programs

Erasmus+ Traineeship — **Oct 2020 – Feb 2021**
École Polytechnique, Palaiseau, France

Erasmus+ Study — **Jan – Jun 2018**
Cardiff University, Cardiff, Wales, UK

Conferences, Workshops and Summer Schools

2024 ISBA World Meeting — **Jul 2024**
Ca' Foscari University of Venice, Venice, Italy
Best Poster Award for *Measuring Dependence under Partial Exchangeability with Reproducing Kernel Hilbert Spaces*

BAYSM2024 — **Jun 2024**
Ca' Foscari University of Venice, Venice, Italy

4th Italian Meeting on Probability and Mathematical Statistics — **Jun 2024**
Sapienza University of Rome, Rome, Italy

Summer School on Optimal Transport, Stochastic Analysis and Applications to Machine Learning — **Jun 2024**
KAIST, Daejeon, South Korea

2023 LMS Invited Lecture Series — **Jul 2023**
Durham University, Durham, England, UK

Turin-Bath PhD Workshop in Applied Probability and Statistics — **Jun 2023**
Collegio Carlo Alberto, Turin, Italy

Workshop Mathematical Statistics — **Apr 2023**
Bocconi University, Milan, Italy

Optimal Transport and Applications — **Oct 2022**
University of Pisa, Pisa, Italy

Summer School in Mathematics of Machine Learning — **Jul 2022**
Scuola Matematica Interuniversitaria, Cortona, Italy

Summer School in Advanced Statistics and Probability: Random Structures and Combinatorial Statistics — **Jul 2022**
Lake Como School of Advanced Studies, Como, Italy

Stochastic Games and Martingale Optimal Transport — **May 2022**
University of Milan, Milan, Italy

Summer School in Geometric Statistics — **Sep 2019**
University of Toulouse III, Toulouse, France

Teaching

Teaching Assistantships

Applied Stochastic Processes - (30515) — **Spring 2024**
BSc Economics, Management and Computer Science, Bocconi University

Foundations of Data Science - (30607) — **Spring 2024**
BSc Economics, Management and Computer Science, Bocconi University

Optimization - (20603) — **Spring 2024**
MSc Data Science and Business Analytics, Bocconi University

Mathematics - module 2 (applied) - (30063) — **Spring 2024**
BSc Economia Aziendale e Management, Bocconi University

Statistics - (30001) — **Fall 2023**
BSc International Economics and Finance, Bocconi University

Bayesian Statistical Methods - (20231) — **Fall 2023**
MSc Data Science and Business Analytics, Bocconi University

Mastering Data for Insurance — **Spring 2023**
SDA Bocconi

Optimization - (20603) — **Spring 2023**
MSc Data Science and Business Analytics, Bocconi University

Mathematics - module 2 (applied) - (30063) — **Spring 2023**
BSc International Economics and Finance, Bocconi University

Advanced Analysis and Optimization - module 1 (30551) — **Fall 2022**
BSc Mathematical and Computing Sciences for Artificial Intelligence, Bocconi University

Mathematics and Statistics II - (145105) — **Spring 2020**
BSc Biomolecular Sciences and Technologies, University of Trento

Calculus A - (145503) — **Fall 2019**
BSc Mathematics, University of Trento

Calculus I - (145432) — **Fall 2019**
BSc Physics, University of Trento

Other teaching activities

Workshop Instructor — **Summer 2023**
Data Science Lab, Bocconi University

Workshop Instructor — **Summer 2023**
Data Science Lab, Bocconi University

Math Help Desk *for Applicant Refugee Students and Asylum Seekers* — **Spring 2020**
University of Trento

Other activities

Volunteering

PhD Representative in the PhD Board — **2022 – ongoing**
Department of Decision Sciences, Bocconi University, Milan, Italy

Student Representative in the Department Council — **2016 – 2018**
Department of Mathematics, University of Bologna, Bologna, Italy

Student Representative in the BSc Board — **2016 – 2018**
BSc Mathematics, University of Bologna, Bologna, Italy

Student Representative in the School Board **2013 – 2014**
Liceo Scientifico Copernico, Bologna, Italy