

Mehdi Nedjar

PhD Applicant — Mathematics and Applications

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in mehdinedjar

Research interests: Optimal Transport (dynamic and multimarginal), variational methods and PDEs, convex/functional analysis, probability on metric spaces.

Research Interests

Optimal transport (static/dynamic formulations, multimarginal problems), calculus of variations and PDE-inspired methods on spaces of measures, convex and functional analysis, probability and metric/topological structures on probabilistic objects.

Education

- 2025–2026 (expected) **M2 — MMMEF**, *Université Paris 1 Panthéon-Sorbonne*, Paris
- **Focus:** Optimization, Neural network, Advanced Machine Learning, Fixed Point Theory, Probability, Data science and mathematical methods for economics/finance.
 - **Selected topics:** optimization; data science; stochastic calculus.
- 2024–2025 **M1 — Applied Mathematics (Economics & Finance)**, *Université Paris 1 Panthéon-Sorbonne*, Paris
- **Probability:** conditional expectation; Hilbert spaces; characteristic functions; Gaussian vectors; convergence; martingales; stopping times; Markov processes.
 - **Statistics & time series:** measure-theoretic foundations; parametric estimation and tests.
 - **Econometrics / data analysis** (English-taught modules included).
 - **Differential equations; functional analysis and optimization** (English courses).
- 2023–2024 **BSc (Year 3) — Pure Mathematics**, *Université Paris Cité*, Paris
- Integration and Fourier series; topology; differential calculus; complex analysis; abstract algebra; differential equations; optimization.
- 2020–2021 and 2022–2023 **BSc — Applied Mathematics for Social Sciences (MIASHS)**, *Université Paris 1 Panthéon-Sorbonne*, Paris
- Measure theory and probability; analysis, optimization and convexity.
 - Computer science: databases; Markov chains; data processing.
 - Mathematical economics: macro/micro; mathematical models in market finance.
- 2019–2020 **CPGE ECS**, *Lycée La Bruyère*, Versailles
- 2019 **Baccalauréat Scientifique (Engineering Sciences), Mathematics track**, *Lycée Robert Doisneau*, Corbeil-Essonnes, *Honours: Mention Assez Bien*

Research Experience & Academic Activities

- 2025–present **Master's thesis (in progress)**, Paris
- **Topic:** dynamic formulations and multimarginal optimal transport; existence/stability beyond compact settings.
 - **Current reading:** *Metrization of probabilistic metric spaces* (Bachir–Nazaret); *Optimal transportation for the determinant* (Carlier–Nazaret); Fields Institute talk on dynamical multimarginal OT.
 - **Goal:** identify minimal tightness/coercivity assumptions ensuring existence and equivalence between static multimarginal couplings and dynamic formulations on general spaces.

- Guided introduction to optimal transport theory (reading/study), supervised by Philippe Bich.
- Proof-driven study of Kantorovich duality (l.s.c. costs bounded below): convex-analytic perspective (Fenchel–Rockafellar / separation), tightness and weak convergence tools.
- Seminars and talks attended: SMF at Institut Henri Poincaré; BFM (as available).

Teaching Experience

- 2022–2024 **Mathematics tutor**, *Partadom / Complétude*, Paris, 15h/week
- One-to-one and small-group tutoring (middle school to high school; including advanced mathematics track).
 - Designed method sheets and structured practice sets.
- 2024–present **Founder (education services)**, *Private tutoring / educational services*, Paris
- Designed pedagogical offer and produced learning resources (\LaTeX materials, online community support, exam preparation).
 - Content creation and outreach (Instagram: @maths.france).

Professional Experience

- 2023 **Executive assistant**, *Services du Premier Ministre*, Paris, Full-time
- Data analysis within the Ministerial Procurement Office.
 - Compliance checks and administrative support for financial programming units.
- 2022 **Business support**, *HSBC Continental Europe*, Paris
- Support to Corporate Bank Coverage teams; client information monitoring and updates.
 - Onboarding certifications (e.g. fighting financial crime, GDPR).
- 2021–2022 **Sport & academic supervisor**, *FC Fleury 91*, Fleury-Mérogis, Full-time
- Coaching and supervision for youth teams; monitoring collective and individual progression.

Awards & Distinctions

- 2021–2022 **Selected participant**, *Programme “La Parole aux 18–28”*, Le Cercle des Économistes (Aix-en-Provence)
- Selected for the Rencontres Économiques d’Aix-en-Provence (youth program).
 - Co-author: *Et si vous transformiez le monde, quelles seraient vos priorités ?* (Éditions Nathan).

Skills

- Mathematics Measure-theoretic probability; functional analysis; convex optimization; differential equations.
- Programming Python (scientific computing); automation scripts; reproducible workflows.
- Typesetting \LaTeX (course notes, assignments, structured documents).

Languages

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| English | Native | |
| English | Advanced | written, spoken |
| Spanish | Intermediate | spoken |
| Arabic | Intermediate | spoken |

Service & Interests

- Volunteering Coordinator at the solidarity restaurant “LaCop1ne”. Member of the General Assembly of *Article 1*; outreach project to popularize mathematics for high-school students (Ma1son).
- Sports Football (forward), long-term practice with intensive training and competitive matches.