

Fernanda Urrea Castillo

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Research interests: optimization, optimal control, variational analysis, Wasserstein spaces, and partial differential equations (deterministic and stochastic).

Education

INSA Rouen Normandie, France	Oct. 2022–Nov. 2026
PhD in Mathematics (expected Nov. 2026). Doctoral advisor: Hasnaa Zidani.	
Universidad Técnica Federico Santa María, Chile	2021–2022
Master of Science in Mathematics, specialization in Optimization. Thesis advisor: Julio Deride.	
Universidad Técnica Federico Santa María, Chile	2016–2021
Mathematical Engineering.	

Research and Industry Experience

Research Intern, Inria Lille – Nord Europe, France	Sep. 2021–Nov. 2021
INOCS team; C++ implementation. Supervisor: Frédéric Semet.	
Research Internship on Variational Analysis and Equilibrium Problems	Mar. 2020–Jul. 2020
Supervised by Julio Deride Silva in Fondecyt No. 11190549.	
Machine Learning Intern, The Not Company	Jul. 2019–Feb. 2020
Developed a neural-network model to identify key recipe ingredients from incomplete data (in Pytorch)	
Supervised by Karim Pichara.	

Teaching Experience

Université Panthéon-Sorbonne	
Introduction to Programming, L1–L2	2025–2026
Integral Calculus, L3	2025–2026
INSA Rouen Normandie	
Functional Analysis, GM3	2023–2024
Numerical Optimization, GM4	2023–2024; 2024–2025
Ordinary Differential Equations, GM3	2024–2025
Universidad Técnica Federico Santa María	
Functional Analysis	First semester: 2020, 2021, 2022
Statistical Inference	Second semester, 2020
Nonlinear Optimization	Second semester, 2020
Algebra and Geometry	Second semester, 2019
Calculus III	Second semester, 2018

Publications

Peer-reviewed articles

- F.U and Hasnaa Zidani. “A Pontryagin Maximum Principle for State-Constrained Control Problems in Wasserstein Spaces.” *SIAM Journal on Control and Optimization* 64(4), 2369–2393, 2026. [doi:10.1137/25M1769922](https://doi.org/10.1137/25M1769922).
- Julio Deride, F.U, and Johannes O. Royset. “A Variational Approach to a Cumulative Distribution Function Estimation Problem under Stochastic Ambiguity.” *Set-Valued and Variational Analysis* 32(4), Article 30, 2024. [doi:10.1007/s11228-024-00732-4](https://doi.org/10.1007/s11228-024-00732-4).

Preprints and work in progress

- F.U and Ernesto Treumún. “Pontryagin Maximum Principle for Non-Smooth State-Constrained Control Problems over Wasserstein Spaces.” Submitted; [arXiv:2609.17197](https://arxiv.org/abs/2609.17197), 2026.
- F.U and Hasnaa Zidani. “Sensitivity Analysis for Free-Time Horizon Problems over Wasserstein Spaces.” In preparation.

Presentations and Posters

- *A variational approach to a cumulative distribution function estimation problem under stochastic ambiguity.* Journée Franco-Chilienne d'optimisation, Perpignan, 2022.
- *Analysing necessary optimality conditions for a time optimal control problem in Wasserstein spaces.* CMM, Universidad de Chile, December 2023.
- *Geometry of the Pontryagin maximum principle.* Atelier des doctorants LMRS/LMI.
- *Optimal control theory in machine learning.* Journée de doctorants, 2024.
- *Pontryagin maximum principle for a minimal time problem in Wasserstein spaces.* Conference on Numerical Methods for Optimal Transport Problems, Mean Field Games, and Multi-Agent Dynamics, Valparaiso, Chile.
- *Optimal Control in Wasserstein Spaces with Applications to Neural ODEs.* Journées Franco-Chiliennes d'Optimisation, 2025.
- *Poster presentation.* Journée de la Fédération Normandie Mathématiques, 2024.
- *Poster presentation.* Conférence sur les Mathématiques de l'Optimisation et de la Décision, Lyon.

Skills

Programming	Python; MATLAB; C++.
Languages	Spanish (native); English (advanced); French (upper-intermediate).