

Yassine Nabou, Ph.D.

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Research Profile

My research lies in mathematical optimization, with a particular focus on the development, analysis, and numerical realization of algorithms for , (non)smooth, constrained, and (non)convex optimization problems. More recently, I have become interested in the optimization foundations of modern machine learning, including distributed optimization, federated learning, communication-efficient optimization, and trustworthy AI. Broadly, my research aims to develop optimization methods that combine rigorous theoretical guarantees with scalable numerical algorithms for real-world applications.

Research Interests

- Mathematical Optimization
- Smooth, Nonsmooth, Convex, Nonconvex, and Constrained Optimization
- Large-Scale Optimization
- Optimization for Machine Learning
- Distributed Optimization and Federated Learning
- Communication-Efficient Optimization
- Trustworthy Machine Learning

Academic Positions

Postdoctoral Researcher – University of Helsinki, Finland Nov 2024 – Present

- Develop and analyze efficient optimization algorithms for smooth, nonsmooth, constrained, and large-scale optimization problems, with theoretical convergence guarantees.
- Develop optimization algorithms for inverse problems and PDE-constrained optimization, bridging optimization theory with computational methods for large-scale problems.
- Design scalable optimization methods for modern machine learning, including distributed optimization, federated learning, communication-efficient optimization.
- Investigate robust optimization algorithms for trustworthy machine learning, with emphasis on heterogeneous, adversarial, and communication-constrained environments.
- Collaborate with researchers across optimization, machine learning, and scientific computing, combining mathematical analysis with efficient implementations in Python and Julia.

Research Intern – N-SIDE, Belgium (Remote) Nov 2023 – Dec 2023

- Investigated optimization methods for large-scale power flow problems arising in European transmission networks.

Visiting Researcher – UCLouvain, Belgium Apr 2022 – Jul 2022

- Developed efficient first-order optimization algorithms for large-scale nonconvex optimization problems with François Glineur.

Visiting Researcher – University of Genoa, Italy (Remote) Sep 2021 – Nov 2022

- Developed higher-order optimization algorithms for structured nonconvex optimization with Silvia Villa.

Visiting Researcher – Toulouse Mathematics Institute, France Dec 2018 – Dec 2019

- Conducted research on optimization methods for inverse problems and variational inequalities with Pierre Maréchal.

Education

Ph.D. in Automatic Control and Systems Engineering Nov 2020 – May 2024
National University of Science and Technology POLITEHNICA Bucharest, Romania

- Marie Skłodowska-Curie Doctoral Fellow (ESR10), Horizon 2020 Innovative Training Network [TraDE-OPT \(Training Data-Driven Optimization\)](#).
- Dissertation: *Efficient Higher-Order Methods for Composite Problems with Applications*.
- Supervisor: Ion Necoara.

M.Sc. in Mathematics and Computer Science 2016 – 2018
Faculty of Science and Technology Settat, Hassan I University, Morocco

B.Sc. in Mathematics and Computer Science 2012 – 2016
Faculty of Science Semlalia, Cadi Ayyad University, Morocco

Selected Publications

Journal Articles

- **Y. Nabou**, I. Necoara. *Moving Higher-Order Taylor Approximation Methods for Smooth Constrained Optimization Problems*. **SIAM Journal on Optimization**, 2026.
- **Y. Nabou**, I. Necoara. *Efficiency of Higher-Order Algorithms for Minimizing Composite Functions*. **Computational Optimization and Applications**, 2024.
- **Y. Nabou**, F. Glineur, I. Necoara. *Proximal Gradient Methods with Inexact Oracle of Degree q for Composite Optimization*. **Optimization Letters**, 2024.

Preprints and Ongoing Research

Manuscripts Under Review

- **Y. Nabou**, I. Necoara. *Regularized Higher-Order Taylor Approximation Methods for Nonlinear Least-Squares*. Second-round review at *SIAM Journal on Optimization*.
- **Y. Nabou**, L. El Bourkhisi, S. U. Stich, T. Valkonen. *Monotone and Nonmonotone Linearized Block Coordinate Descent Methods for Nonsmooth Composite Optimization Problems*. Minor revision at *Journal of Optimization Theory and Applications*.
- **Y. Nabou**. *Nonmonotone Higher-Order Taylor Approximation Methods for Composite Problems*. Under review at *Optimization Methods and Software* (first-round reviews completed; revised manuscript submitted).
- J. Jauhainen, **Y. Nabou**, T. Valkonen. *Dynamic Inverse Problems: Online Regularisation Theory*. Under review at *Inverse Problems and Imaging*.
- J. Jauhainen, **Y. Nabou**, T. Valkonen. *Dynamic Inverse Problems: Single-Loop Online Algorithms*. Under review at *Inverse Problems*.

Conference Publication

- Y. Nabou, L. Toma, I. Necoara. *Modified Projected Gauss–Newton Method for Constrained Nonlinear Least-Squares: Application to Power Flow Analysis*. European Control Conference (ECC), 2023.

Complete publication list: [Google Scholar](#)

Research Funding and Fellowships

Marie Skłodowska-Curie Doctoral Fellowship (ESR10) 2020–2024
European Commission, Horizon 2020 Innovative Training Network (TraDE-OPT).
Selected through an international competitive recruitment process as an Early Stage Researcher within the TraDE-OPT doctoral network on Data-Driven Optimization.

Selected Talks and Presentations

Invited Research Seminars

- **MOP Research Seminar, Saarland University, Germany** Oct 2024
Higher-Order Methods for Composite Optimization with Applications.
Invited by Prof. Peter Ochs (online).
- **ESAT, KU Leuven, Belgium** Sep 2024
Efficient Algorithms for Composite Problems with Applications.
Invited by Prof. Hakan Ergun (online).
- **MaLGa Machine Learning Genoa Center, Italy** Aug 2021
Higher-Order Algorithms for Composite Minimization Problems.
Invited by Prof. Silvia Villa (online).

Conference and Workshop Presentations

- **EUROPT 2025, Southampton, United Kingdom** Jun 2025
Nonmonotone Linearized Block Coordinate Descent Methods for Nonsmooth Composite Problems.
- **Workshop on Analysis and Potential, Bucharest, Romania** Jan 2024
Moving Higher-Order Taylor Approximation Methods for Smooth Constrained Minimization Problems.
- **Conference on Statistical Modeling with Applications, Bucharest, Romania** Sep 2023
Moving Higher-Order Taylor Approximation Methods for Smooth Constrained Minimization Problems.
- **European Control Conference (ECC), Bucharest, Romania** Jun 2023
Modified Projected Gauss–Newton Method for Constrained Nonlinear Least-Squares: Application to Power Flow Analysis.
- **Workshop on Algorithmic and Continuous Optimization, UCLouvain, Belgium** Jul 2022
Efficient Optimization Methods for Complex Systems.

Teaching Experience

University of Helsinki Spring 2026
Lecturer — *MAT11015: Basics of Mathematics in Machine Learning II*
Responsible for the complete delivery of the course, including lectures, exercise sessions, assessment, and the final examination.

University of Helsinki Spring 2025
Course Assistant — *MAT11015: Basics of Mathematics in Machine Learning II*
Supported exercise sessions, supervised students, and participated in grading assignments and examinations.

Academic Service

Conference Organization

European Control Conference (ECC), Bucharest, Romania Jun 2023
Co-organizer of the invited session *Recent Advances in Data-Driven Optimization and Applications.*

Journal and Conference Reviewing

- *Mathematical Programming*
- *IEEE Transactions on Automatic Control*
- *Computational Optimization and Applications*
- European Control Conference (ECC)

Technical Skills

- **Programming:** Python, Julia, MATLAB
- **Machine Learning:** PyTorch, NumPy, SciPy
- **Optimization:** JuMP, CVXPY, Pyomo, IPOPT
- **Languages:** English (Fluent), French (Fluent), Arabic (Native)