

# Michele Barbato — Ph.D.

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## Personal Data

Place of Birth **Avellino (AV) – Italy**  
Date of Birth **May 17, 1987**  
Citizenship **Italian**  
Contact Address **Via Marco Polo 2A, 37138 Verona (VR) – Italy**

## Current Position

**Assistant Professor (RTD-A)**, *The position is financially supported by the project SERICS (PE00000014) under the NRRP MUR program funded by the EU - NGEU, Dip. di Informatica, Univ. degli Studi di Milano, Milan - Italy*

## Past Positions

2018-2023 **Post-doc**, OptLab, Dip. di Informatica, Univ. degli Studi di Milano, Milan - Italy  
2017-2018 **Post-doc**, DEIO - FCUL - Universidade de Lisboa, Lisbon - Portugal  
2016-2017 **Attaché Temporaire d'Enseignement et Recherche**, ENSIIE, Évry - France  
**Post-doc**, LIPN - Université Paris 13, Villetaneuse - France  
2015-2016 **Attaché Temporaire d'Enseignement et Recherche**, LIPN - Université Paris 13, Villetaneuse - France  
2012-2015 **Ph.D. student with teaching activity**, LIPN - Université Paris 13, Villetaneuse - France

## Education

October 2016 **Ph.D. in Computer Science**, *with grade “Très honorable”*, Université Paris 13, Villetaneuse - France  
February 2012 **Master degree in Mathematics**, *with grade 110/110*, Università degli Studi di Padova, Padova - Italy  
February 2010 **Bachelor degree in Mathematics**, *with grade 106/110*, Università degli Studi di Padova, Padova - Italy

## Ph.D. Thesis

Title **A Polyhedral Approach for the Double TSP with Multiple Stacks and Lexico-graphical Orders**  
Supervisors R. Grappe., M. Lacroix, R. Wolfler Calvo  
Committee L. Gouveia, R. Grappe, M. Iori (reviewer), M. Lacroix, A. Ridha Mahjoub (president), F. Meunier (reviewer), F. Roupin, R. Wolfler Calvo.

## Research Interests

**Design and Experimental Analysis of Optimization Algorithms • Combinatorial Optimization • Graph Theory • Linear Programming • Polyhedral Theory**

## Current Research Activity

*MIP approaches for governance and data protection:* design of MIP-based algorithms for the resolution of problems involving network security and data privacy, with an emphasis on applications to network fortification and data analysis. *Privacy enforcement via MIPs:* design of machine learning methods with strong privacy requirements based on the resolution of suitable MIPs. *Diffusion control with interdiction:* design of ILP/QP models and of heuristic/exact resolution algorithms for the optimal control of diffusive phenomena on networks via network interdiction actions. *Routing problems:* design of ILP models, strengthening inequalities and related resolution methods for problems involving synchronization of routes *Polyhedral Theory:* integrality properties of systems of inequalities associated with combinatorial structures in specific graph classes.

## Publications and Accepted Articles

Journal **From strategic planning to virtual clinics operational support to face emergencies: a COVID-19 case study**, with C. Carlevaro, A. Ceselli, G. Confessore, G. De Luca, M. Premoli. In: Operations Research, Data Analytics and Logistics 45 (December 2025)  
DOI: <https://doi.org/10.1016/j.ordal.2025.200484>

Journal **Sub-tree scheduling for wireless sensor networks with partial coverage: complexity and polynomial-size formulations**, with N. Bianchessi. In: Networks 85, pp. 326–347 (2025)  
DOI: <https://doi.org/10.1002/net.22265>

Journal **A polynomial-time dynamic programming algorithm for an optimal picking problem in automated warehouses**, with A. Ceselli, G. Righini. In: Journal of Scheduling 27, pp. 393–407 (2024)  
DOI: <https://doi.org/10.1007/s10951-024-00811-2>

Journal **Mathematical Programming for Simultaneous Feature Selection and Outlier Detection under  $\mathbf{L1}$  Norm**, with A. Ceselli. In: European Journal of Operational Research 316(3), pp. 1070-1084 (2024)  
DOI: <https://doi.org/10.1016/j.ejor.2024.03.035>

Journal **The Hamiltonian  $p$ -Median Problem: Polyhedral Results and Branch-and-Cut Algorithm**, with L. Gouveia. In: European Journal of Operational Research 316(2), pp. 473-487 (2024)  
DOI: <https://doi.org/10.1016/j.ejor.2024.02.032>

Journal **Node based compact formulations for the Hamiltonian  $p$ -Median Problem**, with F. Canas, L. Gouveia, P. Pesneau. In: Networks, 82(4), pp. 336-370 (2023)  
DOI: <https://doi.org/10.1002/net.22163>

Journal **On the impact of resource relocation in facing health emergencies**, with A. Ceselli, M. Premoli. In: European Journal of Operational Research, 308(1), pp. 422-435 (2023).  
DOI: <https://doi.org/10.1016/j.ejor.2022.11.024>

Journal **Box-Total Dual Integrality and Edge-Connectivity**, with *R. Grappe, M. Lacroix, E. Lancini*. In: Mathematical Programming, 197, pp. 307-336 (2023).  
DOI: <https://doi.org/10.1007/s10107-021-01743-x>

Journal **Monopolar Graphs: Complexity of Computing Classical Graph Parameters**, with *D. Bezzi*. In: Discrete Applied Mathematics, 291, pp. 277–285 (2021).  
DOI: <https://doi.org/10.1016/j.dam.2020.12.023>

Journal **The Schrijver System of the Flow Cone in Series-Parallel Graphs**, with *E. Lancini, R. Grappe, M. Lacroix, R. Wolfler Calvo*. In: Discrete Applied Mathematics, 308, pp. 162–167 (2022).  
DOI: <https://doi.org/10.1016/j.dam.2020.03.054>

Journal **Lexicographical polytopes**, with *R. Grappe, M. Lacroix, C. Pira*. In: Discrete Applied Mathematics, 240, pp. 3–7 (2018).  
DOI: <https://doi.org/10.1016/j.dam.2017.04.022>

Journal **Polyhedral Results and a Branch-and-Cut Algorithm for the Double Traveling Salesman Problem with Multiple Stacks**, with *R. Grappe, M. Lacroix, R. Wolfler Calvo*. In: Discrete Optimization, 21, pp. 25–41 (2016).  
DOI: <https://doi.org/10.1016/j.disopt.2016.04.005>

Proceeding **PriSM: A Privacy-Friendly Support Vector Machine.**, with *A. Ceselli, S. De Capitani di Vimercati, S. Foresti, P. Samarati* In: Proceedings of Computer Security – ESORICS 2025. Lecture Notes in Computer Science, Vol. 16053, pp. 62–82 (2025)  
DOI: [https://doi.org/10.1007/978-3-032-07884-1\\_4](https://doi.org/10.1007/978-3-032-07884-1_4)

Proceeding **On the Hardness of Edge Coloring Problems Associated with Scheduling**, with *E. Lancini, D. Delle Donne* In: Beyond Frontiers of Operations Research: Emerging Technologies and Innovative Optimization Paradigms. AIRO Springer Series, Vol. 14, pp. 15–24 (2025).  
DOI: [https://doi.org/10.1007/978-3-031-85894-9\\_2](https://doi.org/10.1007/978-3-031-85894-9_2)

Proceeding **Integrating decision support tools in the COD-19 platform**, with *A. Ceselli, C. Carlevaro, G. Confessore, G. De Luca, M. Premoli*. In: Operations Research for Health Care in Red Zone (ORAHS 2022). AIRO Springer Series, Vol. 10 pp 47-57 (2023).  
DOI: [https://doi.org/10.1007/978-3-031-38537-7\\_5](https://doi.org/10.1007/978-3-031-38537-7_5)

Proceeding **Synchronized Pickup and Delivery Problems with Connecting FIFO Stack**, with *A. Ceselli, N. Facchinetti*. In: Graphs and Combinatorial Optimization: from Theory to Applications. AIRO Springer Series, Vol. 5, pp. 237–249 (2021)  
DOI: [https://doi.org/10.1007/978-3-030-63072-0\\_19](https://doi.org/10.1007/978-3-030-63072-0_19)

Proceeding **On  $k$ -Edge-Connected Polyhedra: Box-TDIIness in Series-Parallel Graphs**, with *E. Lancini, R. Grappe, M. Lacroix*. In: Proceedings of 6th International Symposium on Combinatorial Optimization (ISCO). Lecture Notes in Computer Science, Vol. 12176, pp. 27–41 (2020).  
DOI: [https://doi.org/10.1007/978-3-030-53262-8\\_3](https://doi.org/10.1007/978-3-030-53262-8_3)

Proceeding **Evaluating Automated Storage and Retrieval System Policies with Simulation and Optimization**, with *A. Ceselli, M. Premoli*. In: Advances in Optimization and Decision Science for Society, Services and Enterprises. AIRO Springer Series, Vol. 3 pp 127–137 (2019).  
DOI: [https://doi.org/10.1007/978-3-030-34960-8\\_12](https://doi.org/10.1007/978-3-030-34960-8_12)

Proceeding **Paths and Matchings in an Automated Warehouse**, with A. Ceselli, A. Righini. In: Advances in Optimization and Decision Science for Society, Services and Enterprises. AIRO Springer Series, Vol. 3 pp 151–159 (2019).  
DOI: [https://doi.org/10.1007/978-3-030-34960-8\\_14](https://doi.org/10.1007/978-3-030-34960-8_14)

Proceeding **A Computational Evaluation of Online ATSP Algorithms**, with A. Ceselli, F. Mosconi. In: Advances in Optimization and Decision Science for Society, Services and Enterprises. AIRO Springer Series, Vol. 3 pp 471–481 (2019).  
DOI: [https://doi.org/10.1007/978-3-030-34960-8\\_41](https://doi.org/10.1007/978-3-030-34960-8_41)

Proceeding **A Set Covering Approach for the Double Traveling Salesman Problem with Multiple Stacks**, with R. Grappe, M. Lacroix, R. Wolfler Calvo. In: Proceedings of 4th International Symposium on Combinatorial Optimization (ISCO). Lecture Notes in Computer Science, Vol. 9849 pp. 260–272 (2016).  
DOI: [https://doi.org/10.1007/978-3-319-45587-7\\_23](https://doi.org/10.1007/978-3-319-45587-7_23)

## Other Manuscripts

Preprint **Mathematical programming algorithms for convex hull approximation with a hyperplane budget**, with A. Ceselli, R. Messana. (2024)

Seminar Note **Cheapest Routes with Integer Linear Programming**, *Univ. degli Studi di Padova*

## Editorial Activity

Editor **Beyond Frontiers of Operations Research: Emerging Technologies and Innovative Optimization Paradigms – Proceedings of the 7th AIROYoung Workshop (February 15-17, 2023, University of Milan, Italy) and 8th AIROYoung Workshop (February 14-16, 2024, University of Calabria, Italy)**,  
Eds. M. Barbato, A. De Maio, G. Macrina, L. Peirano, M. Premoli.  
AIRO Springer Series 14 (2025),  
DOI: <https://doi.org/10.1007/978-3-031-85894-9>

Editor **Mathematics, Algorithms and the Art and Science of Decision-Making – Proceedings of Optimization and Decision Science 2025 (September 1-4, 2025, University of Milan, Italy)**,  
Eds. M. Barbato, N. Bianchessi, A. Boggio Tomasaz.  
To appear in AIRO Springer Series

## Computer Skills

Optimization Software **CPLEX, Gurobi, JuMP**

Programming Languages **C, C++, Python, Julia**

## Languages

English	<b>Fluent</b>	French	<b>Proficiency</b>
Italian	<b>Native speaker</b>	Portuguese	<b>Basic</b>

## Invited Talks

November 25, 2016 **Polyhedral Results and a Branch-and-Cut Algorithm for the Double Traveling Salesman Problem with Multiple Stacks**, *Universidade de Lisboa*, Lisbon - Portugal

October 10, 2014 **Lexicographical Polytopes**, *LIX-École Polytechnique*, Palaiseau - France

## Talks in Conferences and Workshops

September 6 2023 **Compact Optimization Models for the Sub-Tree Scheduling of Wireless Sensor Networks with Partial Coverage**, *International Conference on Optimization and Decision Science (ODS 2023)*, Ischia - Italy

August 31 2022 **Simultaneous Feature Selection and Outlier Detection: New MILP Formulation and an Experimental Study**, *International Conference on Optimization and Decision Science (ODS 2022)*, Florence - Italy

June 24 2022 **The Hamiltonian p-Median Problem: Polyhedral Results and Branch-and-Cut Algorithm**, *3rd Workshop on Combinatorial Optimization*, online

June 14 2022 **Multi-Purpose Machine Scheduling: An Application to Smart Cosmetic Manufacturing**, *15th Workshop on Models and Algorithms for Planning and Scheduling (MAPSP 2022)*, Oropa - Italy

May 18 2022 **The Hamiltonian p-Median Problem: Polyhedral Results and Branch-and-Cut Algorithm**, *7th International Symposium on Combinatorial Optimization*, online

November 19 2020 **Combining epidemiologic and clustering models to limit the spreading of pandemic diseases**, *ODS 2019 – Meeting of AIRO*, online

September 14 2020 **Synchronized Pickup and Delivery Problems with Connecting FIFO Stack**, *18th Cologne-Twente Workshop on Graphs and Combinatorial Optimization*, online

September 7, 2019 **A Computational Evaluation of Online ATSP Algorithms**, *ODS 2019 – 49th AIRO Meeting*, Genova - Italy

March 28, 2019 **Monopolar Graphs: Complexity of Computing Classical Graph Parameters**, *3rd AIRO Young Workshop*, Rome - Italy

September 7, 2017 **New inequalities and formulations for the double TSP with multiple stacks**, *Optimization 2017*, Lisbon - Portugal

July 11, 2017 **A new model and strengthening inequalities for the double TSP with multiple stacks**, *VeRoLog 2017*, Amsterdam - Netherlands

February 22, 2017 **Polyhedral Results on the Double TSP with Multiple Stacks**, *ROADEF 2017*, Metz - France

October 14, 2016 **Polyhedral Results and a Branch-and-Cut Algorithm for the Double TSP with Multiple Stacks**, *Workshop “Problèmes d’ordonnancement et de routing intégrés”*, Tours - France

May 17, 2016 **A Set Cover Approach for the Double Traveling Salesman Problem with Multiple Stacks**, *4th International Symposium on Combinatorial Optimization*, Vietri sul Mare - Italy

July 30, 2014 **Bounded revlex polytopes**, *Recent Advances in Linear Optimization*, Paris - France

February 27, 2014 **An exact method for solving the Double Traveling Salesman Problem with two stacks**, *ROADEF 2014*, Bordeaux - France

## Other Attended Conferences and Schools

2023 **7th AIRO Young Workshop**, Milan - Italy

2022 **ISCO Spring School on Quantum Algorithms for Optimization**, on-line

2021 **5th AIRO Young Workshop**, on-line

2020 **4th AIRO Young Workshop**, Bolzano - Italy

2018 **7th Winter School on Network Optimization**, Lisbon - Portugal

2017 **International Network Optimization Conference (INOC) 2017**, Lisbon - Portugal

2016 **Workshop on Polyhedral Approaches for Combinatorial Optimization**, Paris - France

**ISCO Spring School on Extended Formulations**, Vietri sul Mare - Italy

2015 **4th Winter School on Network Optimization**, Lisbon - Portugal

2014 **GERAD Spring School on Column Generation**, Paris - France

2013 **JPOC8 School on Sub-Modular Functions**, Clermont-Ferrand - France

**Order and Geometry: School on Posets and Discrete Geometry**, Berlin - Germany

**ECCO XXVI**, Paris - France

## Relevant Teaching Activities

2024 Exercise sessions: **Laboratory of C Programming (36 hours)**, University of Milan  
*Lectures and exercise sessions: Laboratory of Mathematics, data processing, interpretation and elaboration (20 hours)*, Consorzio per la Formazione Professionale e per l'Educazione Permanente, Casalpusterlengo (LO), Italy

2016-2017 *Exercise sessions: Graph Theory (42 hours) • Operations Research (42 hours) • Mathematical Optimization (28 hours)*, ENSIIE, France

2015-2016 *Exercise sessions and computer laboratory: Calculus (27 hours) • Linear Algebra (9 hours) • Imperative Programming (36 hours)*, Université Paris 13, France  
*Computer laboratory: Combinatorial Optimization (9 hours) • Graph Algorithms (19.5 hours) • Data Structures (12 hours) • Shell Programming (24 hours)*, Université Paris 13, France  
*Lectures and computer laboratory: UNIX (28.5 hours)*, Université Paris 13, France

2012-2015 *Computer laboratory: Graphical Interfaces (69 hours) • UNIX (30 hours)*, Université Paris 13, France  
*Exercise sessions and computer laboratory: Imperative Programming (49.5 hours)*, Université Paris 13, France

## Thesis Advisorship and Co-advisorship

2018-present *Thesis advisorship (‡) and co-advisorship (†):* **Axel Vassena** – Computer Science undergraduate thesis: “Mathematical Programming for the Optimization of Wireless Sensor Networks with Operational Reliability” (‡ in Italian) • **Federico Tabellini** – Computer Science undergraduate thesis: “Optimization Algorithms for Wireless Sensor Networks with Operational Reliability Constraints” (‡ in Italian) • **Maryam Asgari** – Computer Science master thesis: “Models and algorithms for privacy in vertical federated learning” (†) • **Massimo Cavagna** – Computer Science master thesis: “Experimenting Data-Driven Constraint Generation in Mathematical Programs” (†) • **Afarin Jamshidi** – Computer Science master thesis: “Computational Evaluation of Mathematical Programming Models for Sparse Regression with Outliers” (‡) • **Alberto Bertoncini** – Computer Science master thesis: “Experiments on Cutting Planes for the Training of Regression Models” (†) • **Antonio Belotti** – Computer Science master thesis: “Algorithms for Sparse Support Vector Classifiers” († in Italian) • **Andrea G. Staibano** – Computer Science undergraduate thesis: “Algorithms for the real-time optimization of an automated warehouse” († in Italian) • **Nicolas Facchinetti** – Computer Science undergraduate thesis: “Heuristic Algorithms for a Pickup and Delivery Problem with Single Intermediate Stack” († in Italian) • **Antonio Belotti** – Computer Science undergraduate thesis: “Algorithms for Scheduling Problems with Multi-Purpose Machines” († in Italian) • **Filippo Mosconi** – Computer Science undergraduate thesis: “Experimental Analysis of Algorithms for the On-Line ATSP” († in Italian)

## Other Activities

2025 Member of the Program and Scientific Committee of Optimization and Decision Science 2025 ([ODS 2025](#))

2023 Main organizer of the [7th AIROYoung workshop](#)

2021-2024 Member of AIROYoung board and web curator of the [AY website](#)

2017-present Reviewer for the following international journals: *4OR, Computers and Operations Research, Discrete Applied Mathematics, Discrete Optimization, European Journal of Operational Research, Journal of Scheduling, Networks, Omega, Operations Research Letters*