

Christian Piermarini

Curriculum Vitae



Available for the internship starting from June 2024, returning to my Ph.D. program after the internship.

Education

- Jan 15th – May 25th, 2024 **Visiting appointment @** Lehigh University, Bethlehem. Pennsylvania
- Working at the Department of Industrial and Systems Engineering in the OPTML (Optimization for Machine Learning) under the supervision of Prof. Frank E. Curtis.
I am working on Sequential Quadratic Programming algorithms for stochastic optimization of PDE-constrained neural networks.
- Jul 24th–Aug 05th 2022 **“Summer graduate School – Mathematics of Machine Learning”**, organized by Scuola Matematica Interuniversitaria (SMI) at the Palazzone di Cortona, followed and successfully completed
- 3rd-9th July 2022 **“Summer school on optimization, big data and applications (OBA2022)”**, followed and successfully completed;
- 9th-20th May 2022 **“Iterative methods for large-scale saddle point problems course” followed and successfully completed,**
- Lecturers: Professor Michele Benzi, Scuola Normale Superiore, Pisa, and professor Fabio Durastante, Dipartimento di Matematica, Università di Pisa.
- Grade: A
- March 2022 **“Scientific writing course” followed and successfully completed.**
- Lecturer: professor Enrico Matriccioni.
- Grade: passed
- Nov 2021- Jan 2025 **Following the ABRO PhD program, Department of Computer, Control and Management Engineering,**
- Focus of my research are mathematical algorithms (CG, Lanczos, SYMMBK with matrix factorization) for large scale optimization methods. Also working on machine learning models (GNN, MLP, LSTM, ARIMA) for financial data prediction and optimization methods for simulation models.
- Sep 2019 – Jul 2021 **Master’s Degree in Management Engineering and Operation Research,**

Sapienza University of Rome, Italy.

Grade: 110/110 cum laude

○ Curriculum: Decisional Models for Management Engineering

○ Thesis: "Application of the Simulation-based Optimization approach for the analysis of the ambulance diversion phenomenon in a first-aid network."

○ The aim of the thesis is to examine the performances of a first-aid network to vary the diversion policies through the development of four simulation models and their optimization via an appropriate optimization algorithm.

Advisors: Prof. Massimo Roma, Stefano Lucidi

○ Core courses: service systems and simulation, operational research, process management and mining, optimization methods for machine learning, continuous optimization, complex systems optimization, combinatorial optimization, modeling and identification, games and equilibria.

Feb 2021 – Jun 2021 **Students Honors Program,**

Sapienza University of Rome, Italy.

Admitted and fulfilled

Sep 2016 – Jul 2019 **Bachelor's Degree in Management Engineering,**

Sapienza University of Rome, Italy.

Grade: 110/110 cum laude

Sep 2011 – Jul 2016 **Scientific High School,**

Liceo Scientifico Giuseppe Piazzi, Istituto d'Istruzione Superiore Margherita Hack,, Morlupo, Italy.

Grade: 100/100 cum laude

Implementation Projects

○ **Master Thesis:**

- Development of various simulation models through ARENA™ Simulator

- Intensive data management and analysis through the Excel software

- Development of a specific Python code for the communication between the ARENA simulation model and the optimization algorithm

○ **Optimization Methods for Machine Learning:**

Multilayer Perceptron and Radial Basis Function Neural Networks to solve a regression problem (Python).

Support Vector Machines to solve a classification problem (Python).

○ **Process Management and Mining:**

Modeling of a bank services through the BPMN language, run of the simulation in Bizagi modeler, development of a basic automation interface in Bizagi Studio, data mining of the process in ProM.

Experiences

- 2013 **Olympiads in Maths** participation.
- Feb 2015 **Participation in IMUN Italian Model United Nations competition**
- Jul 2019 – Sep 2019 **Full time job as a tourist guide for Opera Romana Pellegrinaggi, Openbus Vatican&Rome service**
- 24th February 2022 **“7th Airo Young Workshop 2022” participation, Rome**
- Aug 30th - Sep 2nd 2022 **“ODS2022 International Conference on Optimizattion and Decision Science”, Firenze (Italy)** Presentation of the paper titled "The Ambulance Diversion phenomenon in an Emergency Department network: a case study;
- 15th – 18th Feb 2023 **“8th Airo Young Workshop 2023” participation, Milan (Italy),** Presentation of the paper “Computing Negative Curvature directions for Large Scale optimization: exploiting SYMMBK”
- Sep 2022 – Feb 2023 **Teaching assistant** for “Calculus 1” and “Operations Research” exams, Software Engineering and Management Engineering BSc, “La Sapienza” university.
- Mar 2023 – May 2023 **Teaching assistant** for “Simulation and Systems modeling” exam, Management Engineering MSc, “La Sapienza” university.
- 11th- 15th Sep 2023 **Summer school & Conference: mathematical optimization for machine learning, Berlin, Germany.**
- Sep 2023 – Feb 2024 **Teaching assistant** for “Calculus 1” exam, Software Engineering BSc, “La Sapienza” university.

Computer Skills

Python, Pytorch, AMPL, LaTeX, ARENATM Simulator, Simio simulator, Microsoft Office, My SQL, Fortran .90, basics of C and Java

Languages

- 0 **Italian:** Mother tongue
- 0 **English:** Advanced, both written and spoken, having the B1 level PET Cambridge certificate and the B2 FCE Cambridge certificate, and having attended for three years summer schools in Reading, Portsmouth and Greenwich (London)
- 0 **Spanish :** Knowledge of few words and simple phrases

Scientific publications

- 9 Aug 2021 **Technical Report**
Christian Piermarini, Massimo Roma, “A Simulation–Based Optimization approach for analyzing the ambulance diversion phenomenon in an Emergency Department network”, published on *ArXiv.org*.
- March 2022 **Technical Report**
Christian Piermarini, Massimo Roma, Giovanni Fasano, “Bridging the Gap between Trust–Region Methods (TRMs) and Linesearch Based Methods (LBMs) for Nonlinear Programming: Quadratic Sub–Problems”

May 2022	<p>Paper</p> <p>Christian Piermarini, Massimo Roma, “The Ambulance Diversion phenomenon in an Emergency Department network: a case study”, published for ODS 2022 Proceedings.</p>
April 2023	<p>Paper (accepted)</p> <p>Christian Piermarini, Massimo Roma, Giovanni Fasano, “On the use of the SYMMBK algorithm for computing negative curvature directions within Newton–Krylov methods”, accepted to be published for ODS 2023 proceedings.</p>
May 2023	<p>Paper (Reviewing phase)</p> <p>Christian Piermarini, Massimo Roma, “A Simulation-Based Optimization approach for analyzing the ambulance diversion phenomenon in an Emergency Department network”, reviewing phase for “healthcare management science”.</p>
July 2023	<p>Paper (Reviewing phase)</p> <p>Giovanni Fasano, Christian Piermarini, Massimo Roma, “On the use of the SYMMBK algorithm for computing negative curvature directions within Newton-Krylov methods”, for COAP.</p>
February 2024	<p>Paper (Reviewing phase)</p> <p>Giovanni Fasano, Christian Piermarini, Massimo Roma, “Benchmarking optimization algorithms with Quality Profiles”.</p>
April 2024	<p>Paper (Reviewing phase)</p> <p>Christian Piermarini, Giorgio Grani, “Using Graph Neural Networks and Conditional value at risk to predict multi-market portfolio optimization strategies”, submitted to ODS 2024 proceedings.</p>

