

Supervisor Project Idea

Supervisor

Insert a brief CV and/or external link, the total number of publications, the ORCID link, 5 of the most significant/recent publications, and a list of funded projects and awards. Please indicate if you are a MSCA fellow yourself and if you have already been a MSCA Supervisor before. max 300 words

Fabrizio Marinelli is a Full Professor in Operations Research at the Università Politecnica delle Marche.

His research focuses on discrete optimization, with particular emphasis on cutting and packing problems, mathematical programming, heuristic and exact algorithms, and applications in industrial manufacturing and logistics.

His publication record includes 30 papers in international journals, 31 book chapters and conference proceedings, and about 60 short or extended abstracts presented at international conferences.

His ORCID ID is 0000-0003-0405-3110.

Among his most significant and recent publications are:

- One-dimensional bin packing with pattern-dependent processing time (European Journal of Operational Research, 2024),
- Robust stock assortment and cutting under defects in automotive glass production (Production and Operations Management, 2022),
- LP-based dual bounds for the maximum quasi-clique problem (Discrete Applied Mathematics, 2021),
- Number of bins and maximum lateness minimization in two-dimensional bin packing (European Journal of Operational Research, 2021), and
- Optimal stock control and procurement by reusing obsolescences in manufacturing (Computers & Industrial Engineering, 2020).

Fabrizio Marinelli has been in the advisory board of a project funded by the VI European Framework Programme. He has been a member, also in the role of scientific coordinator of a research unit, of Italian projects sponsored by the Education and Research Ministry (PRIN 2015, PRIN 2009, PRIN 2003).

Since 2015, Fabrizio Marinelli has been in charge, as scientific coordinator, of six industrial projects. He also was the representative of a bilateral agreements with the Graduate School of Informatics, Nagoya University, with CNR "Mauro Picone" Institute, and with the Centre of Excellence DEWS of the University of L'Aquila.

His contributions have been recognized the Best Student Paper Award at ICORES (2018), and the first place in Italy in the ROADEF/EURO Challenge (2018). Additionally, his work has been acknowledged in the INFORMS Practice Literature as one of the top worldwide contributions (2009).

Research Group Description

Provide the name the reference department and a brief description of the research group, including external links, and available instrumentations and infrastructures. **max 300 words**

The Operations Research Group at the Department of Information Engineering of the Università Politecnica delle Marche, led by Prof. Fabrizio Marinelli (www.dii.univpm.it/fabrizio.marinelli), focuses on the design and implementation of mathematical models and optimization algorithms for complex decision-making problems. While its primary research areas include manufacturing and logistics (e.g., packing, scheduling, and routing), the group also explores applications in less traditional Operations Research domains, such as energy systems management and software engineering.

The group collaborates with several national and international research teams, as well as companies and industries (see LORA – Lab for Operations Research Applications at <http://lora.dii.univpm.it>).

Over the past ten years, the main academic collaborations have included institutions such as Politecnico di Milano (Italy), Università degli Studi dell'Aquila (Italy), Università "La Sapienza" – Rome (Italy), Università degli Studi di Napoli FEDERICO II (Italy), IASI-CNR (Italy), École Polytechnique (France), Universidade do Minho – Braga (Portugal), Nagoya University (Japan), University of Graz (Austria), and Bilkent University (Turkey).

The group has also collaborated with major industrial partners, including Schnell Group, Luxottica Group, SCM Group, and Pluservice.

Research thematic area

Indicate the MSCA panel and keywords that better describe your field of competence and research thematic area of your interest for a MSCA PF supervision – you may add extra keywords and text if necessary.

MSCA Panel Chemistry (CHE) - Economic sciences (ECO) - Information Sciences and Engineering (ENG) - Environmental and Geosciences (ENV) - Life Sciences (LS) - Mathematics (MAT) - Physics (PHY) - Social Sciences and Humanities (SOC)	MSCA Keywords  MSCA Panels & Keywords.pdf Link document	Free keywords	Free text
Information Sciences and Engineering (ENG); Mathematics (MAT)	Numerical analysis, simulation, optimisation, modelling tools		
	Artificial intelligence, intelligent systems, multi agent systems		
	Discrete mathematics and combinatorics	Graph algorithms, Combinatorial optimization	

Contact details (including email address of the supervisor)

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Personal web page: <https://sites.google.com/view/fabmarin2018/home>

OPTIONAL:

Title and goals

Provide the title of the topic and a short summary if you already have a project idea.

Projects ideas can also be defined and discussed with potential candidates later.

max 200 words

Title: Advanced Optimization for Cutting, Packing, and Inventory-Scheduling Integration

The project focuses on the development of advanced optimization models and algorithms to address complex Cutting & Packing (C&P) problems, integrating scheduling and inventory management. Traditional approaches to C&P mainly aim at minimizing trim loss, but real-world industrial applications require a broader perspective, incorporating machine capabilities, order deadlines, and production efficiency.

The research will explore integer linear programming (ILP) and heuristic approaches, leveraging decomposition techniques, column generation, and dual bound tightening strategies to handle the exponential complexity of large-scale problems. By integrating cutting-stock optimization with sequencing constraints, the study aims to reduce setup costs while improving scheduling. Additionally, part recombination and lot-sizing techniques will be analyzed to minimize waste and balance workloads. Another key aspect of the project involves the minimization of patterns to streamline production while maintaining flexibility. The research will also address robust optimization methods to manage uncertainties related to defective materials, fluctuating demand, and machine constraints.

By combining C&P optimization with scheduling and inventory control, this project will provide practical decision-support tools applicable in various industries, including woodworking, automotive, glass, and metal cutting. The expected outcome is a set of methodologies that enhance production efficiency while ensuring adaptability to real-world constraints.