

# Raffaella Mirandola: curriculum vitæ et studiorum

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## KEY DATA

### Education

- Ph.D. in Computer Science, University of Roma Tor Vergata, Italy, 1994.
- M.Sc. in Computer Science University of Pisa, Italy, 1989.

### Academic experience

I am an Associate Professor at Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano. I am an active member of the scientific community and I regularly serve in international program committees and as a referee for top-ranked journals. I'm a *member of the editorial board* of the IEEE Transactions of Software Engineering and of the Journal of System and Software (Elsevier). I organized several international conferences as Program Chair (ECSA20015, SATTa Track at ACM SAC 2013-2015, ICPE2011, MOCS Track at Euromicro SEAA 2010-2012, QoSA2009) and co-organized two Dagstuhl Seminars.

### Research Areas

My main research interests are in: (i) Software quality requirements modeling, analysis and verification, (ii) Formal methods for (self-)adaptive dependable IT systems, (iii) Model-driven software engineering and the application of the theories, approaches and techniques specific to the above research areas to *service-oriented* and *component-based* systems, *adaptive systems*, *mobile systems*, and *cloud computing*. The research has been funded by several national and international projects, among which the FP7 European project Q-ImPRESS: "Quality Impact Prediction for Evolving Service-Oriented Software", for which I was Principal Investigator for Politecnico. More recently, I have been working on computing education research mainly focusing on observations and data analysis related to the innovative Distributed Software Development course.

### Scientific Results

In the last 8 years, I have published three papers in the IEEE Trans. on Software Engineering, one paper on IEEE Trans. on Reliability and one paper on the ACM Trans. on Computing Education among the 24 journal publications. In total, I have published 150+ peer-reviewed papers in international journals and conferences/symposia.

Important research contributions widely cited in the literature are: the definition and generation of formal models at runtime and their usage in the area of service-oriented application (e.g., [IC.51],[JR.26],[JR.22],[JR.25]); the quality assurance of self-adaptive systems (e.g., [IB.2],[IB.6],[JR.11],[JR.19]); and the definition and generation of software quality models at design time (e.g., [IC.81],[JR.32],[JR.29]).

Based on Google Scholar (10/05/2020), my h-index is 35 with 7372 as a total number of citations.

### Teaching

Starting from 1997, 2+ courses taught per academic year, including: Computer Science Fundamentals (undergraduate course), Computer Infrastructure (graduate course), Software Engineering (graduate course), Distributed Software Development (graduate course). I have supervised several students for Master thesis.

## Degrees

- Ph.D. in Computer Science, University of Roma Tor Vergata, Italy, 1994.  
Title: *Hierarchical models for performance evaluation of computer and communication systems*
- M.Sc. in Computer Science University of Pisa, Italy, 1989.  
(Thesis title: *Hybrid simulation and variance reduction methods for performance evaluation of queueing network models*)

## Full professor qualification

- 01/B1, INF/01 (from 29/01/2014 to 29/01/2023)
- 09/H1 ING-INF/05 (from 03/12/2013 to 16/01/2029)

## Employment History

- Associate Professor at Dipartimento di Elettronica, Informazione e Bioingegneria, Politecnico di Milano (August 2011 – present)
- Assistant Professor at Dipartimento di Elettronica e Informazione, Politecnico di Milano (November 2005 – July 2011)
- Assistant Professor at the Computer Science Department, University of Rome Tor Vergata (November 1997 – October 2005)
- Post-Doc Fellow at the Computer Science Department, University of Rome Tor Vergata (November 1995 – October 1997)

### VISITING EXPERIENCE

International Visiting Full Professor, *Linneus University, Sweden*, (September 2018-August 2019), Swedish KK-Stiftelsens grant 20170232

## Collaborations

The following are the most active scientific collaborations:

- *Linneus University, Sweden*, collaboration with Prof. Jesper Andersson and Prof. Marco Caporuscio
- *York University, UK*, collaboration with Prof. Radu Calinescu
- *Katholieke Universiteit Leuven, Belgium* collaboration with Prof. Danny Weyns
- *KIT University, Germany* collaboration with Prof. Ralf Reussner
- *Chalmers University, Sweden* collaboration with Prof. Ivica Crnkovic
- *INRIA, France* collaboration with Prof. Jean-Marc Jezequel
- *Zagreb University, Croatia* collaboration with Prof. Igor Cavrak and Dott. Ivana Bosnic
- *CMU University, USA* collaboration with Prof. David Garlan
- *SEI, USA* collaboration with Dr. Grace Lewis
- *UCIrvine, USA* collaboration with Prof. Sam Malek
- *Carleton University, Canada* collaboration with Prof. Dorina Petriu
- *University of Milano, Italy* collaboration with Prof. Elvinia Riccobene
- *University of Bergamo, Italy* collaboration with Prof. Patrizia Scandurra
- *ISTI-CNR, Italy* collaboration with Prof. Antonia Bertolino
- *University of Roma Tor Vergata, Italy* collaboration with Prof. Vincenzo Grassi
- *Gran Sasso Science Institute, L'Aquila Italy* collaboration with Dott. Catia Trubiani

## Academic Services

- President of the commission for the Evaluation Committee of the Bachelor and Master degree programs in Computer Engineering (Segretario di Laurea) (2013-present)
- Member of the PhD Advisory Board in Computer Engineering at Politecnico di Milano (2017-present)
- Delegate member of the Computer Engineering degrees at the Faculty Evaluation Committee (2013-present)
- Member of several evaluation committees (in Italy and in Europe) for the appointment of junior and senior researchers (2014-present)
- Member of the PhD Admission Committee (2012)
- Member for the Evaluation Committee of State Exams for the Qualification to the Engineering Profession (2009)

## Description of Scientific Results

The main research interests are in:

- Software quality requirements modeling, analysis and verification
- Formal methods for (self-)adaptive dependable IT systems
- Model- driven software engineering

and the application of the theories, approaches and techniques specific to the above research areas to *service-oriented* and *component-based* systems, *adaptive systems*, *mobile systems*, and *cloud computing*. Her research has been funded by several national and international projects, among which the FP7 European project Q-ImPrESS: Quality Impact Prediction for Evolving Service-Oriented Software, for which she was Scientific Responsible and also local responsible for Politecnico.

An orthogonal research line concerns teaching and **computing education research** mainly focusing on observations and data analysis for the innovative Distributed Software Development (DSD) course. The results have been published in the **Information and Software Technology** journal [JR.5], the **ACM Transactions on Computing Education** [JR.6], and at the conferences [IC.13],[WS.10]. DSD is a project course held together with the University of Zagreb and Malarladen University, Vasteras, Sweden. The students learn how complex is working in distributed and geographically dispersed teams, using tools and technologies for distributed development environments and discovering how to cooperate with people of different cultures and how to manage in a predictable way the software development process. DSD teams participated and won various editions at the international project competitions in the International Conference on Software Engineering (2017/2018: winners, 2015/2017: team in semi-finals, 2012/2013: winners).

### SOFTWARE QUALITY REQUIREMENTS MODELING, ANALYSIS AND VERIFICATION

A key requirement for software is becoming the capability to keep providing the required quality of service (QoS), in terms of performance, dependability and operating cost (e.g., energy consumption). To this end, quality goals must be carefully and continuously pursued throughout the lifecycle, and especially from its very beginning. Indeed, if unacceptable qualities are discovered late in the project, it is necessary to either abandon the system entirely or go back through redefinition, redesign and redevelopment phases until the system becomes acceptable. Both options are clearly much more expensive than meeting the quality goals

since the initial stages. For these reasons the research has been directed to the (automatic) generation and use of software quality models in a continuous way starting from design time until runtime.

**Scientific contributions** A first research area has been the definition and generation of quality models at design time, with the definition of PRIMA-UML [IC.81], [IC.80], [JR.32] for example, which represents a seminal work in this area widely cited in the reading list of academic courses and in the literature, see for example the citations of Google Scholar for the **WOSP paper** [IC.81], and the **Science of Computer Programming** journal [JR.32]). These methods have been applied to the domain of mobile software architectures and the results presented in [IC.77] and in the **IEEE Transaction on Mobile Computing** [JR.30].

For component-based systems we have been working at a general framework for enabling the early validation of component-based systems on the basis of the architectural specification. We started with a survey on existing methods for the quality analysis of component-based systems presented in [IB.14]. Then, the definition of the Component-Based Software Performance Engineering (CB-SPE) [IC.71], [IC.73], [IC.72], [IC.62] [WS.22], [OJ.4] has been one of the result of this work, which is widely cited in the literature (see for example the citations of Google Scholar for the CBSE [IC.71]). In this context, a common component modeling example has been produced and presented in the widely cited **Springer Book** [BK.1], to provide a common case study to be used as a basis for comparisons of different approaches. Different techniques based on optimization methods have been investigated and presented in [IC.47] and in two journal papers [JR.27], [JR.21] published on **Journal of Systems and Software**.

Another result concerns the definition and analysis of different kind of failures that can affect the overall system behavior [IC.44], [IC.41], [IC.26], in the **Transactions on Reliability** journal [JR.14] and in the **Software: Practice and Experience** journal [JR.10]. The paper [IC.44] received the **best paper award** at the CBSE conference.

More recent research contributions consist in the definition of models at runtime (presented at **ICSE Conference** [IC.51]) and their usage in the area of self-adaptive systems and service-oriented application, presented in [IC.59], [IC.50], [IC.49], [IC.53], [IB.7], [IC.29], [IC.28], [IC.18], [IC.15], [IB.3] and in the **IEEE Transactions on Software Engineering** journals [JR.26], [JR.25], [JR.12]. The obtained results are widely cited in the literature, see for example the citations of Google Scholar for the **ICSE paper** [IC.51], the **ESEC/FSE** paper [IC.49], and the **IEEE Transactions on Software Engineering** [JR.26] and [JR.25].

The adaptive composition of services based on reinforcement learning techniques has been the topic of research published in [IC.15] and **Future Generation Computer Systems, Elsevier** [JR.1]. In this context, a contribution with a special focus on energy has been presented in [IC.2]

The results of a new research line considering the identification and management of uncertainties in model-based approaches have been presented in [IC.12], [IC.24], [IC.25] (Best paper candidate), in the book chapter [IC.2], and in the paper [IC.1] (Best paper candidate).

## FORMAL METHODS FOR (SELF-)ADAPTIVE DEPENDABLE IT SYSTEMS

In modern software applications, two requirements are becoming common: software must adapt continuously to respond to changes in application objectives and in the environment in which it is embedded, and it is expected to fulfil its dependability. To this end the seamless use of *formal verification techniques* preventing errors from reaching the final implementation (or at least removing them when a new version of the software is deployed) has been proved to be a feasible way to reach these goals.

**Scientific contributions** In this area, the main contributions concern the definition of an overall framework promoting the use of quantitative formal techniques at runtime presented in [IB.7] and in the **Communication of ACM** [JR.22], as well as a set of specific techniques proposing the use of formal methods to deal with adaptable dependable systems. Specifically, Petri Nets and Queueing Networks have been applied to plan system adaptation while minimizing the energy consumption, in **Journal of Systems and Software** [JR.23], in

**Sustainable Computing, Informatics and Systems** [JR.20] and in **International Journal of Performability Engineering** [OJ.1] respectively. Petri Nets have also been applied to devise the most suitable number of resources to be used when the workload of the application presents some burstiness [IC.32] and in the **Journal of Systems and Software** paper [JR.11]. More recently, formal models have also been applied for time-sensitive adaptation in Cyber Physical Systems through run-time configuration generation and verification and the results presented in the conference papers in the conference papers [IC.23] and [IC.21], [IC.16], [IC.11], [IC.10], [IC.9], and in the **Journal of Systems and Software** [JR.9] and in the **Journal of Software: Evolution and Process, Wiley**[JR.4].

The use of formal models for the definition of adaptation plans in cloud infrastructure has been discussed in [IC.22], [IC.17]. Based on that, we have also explored their combination with machine learning techniques in the **Journal of Network and Computer Applications** [JR.8], in **Future Generation Computer Systems, Elsevier** [JR.7], and in the **Computing Journal, Springer** [JR.3].

Another formalism, called Abstract State Machine (ASM), has been extended to deal with reliability analysis in [IC.30], [IB.4] and in the **Journal of System and Software** paper [JR.15] providing a unique component model, which is both the design oriented model of the component assembly and the formal analysis-oriented model and that leads the reliability analysis. The combined use of optimization techniques and design patterns and tactics have been exploited to explore the state space adaptation of service oriented applications in [IC.38] and in the **Science of Computer Programming** journal [JR.18].

Some of these topics, concerning the definition of metrics for system adaptability and the definition of different types of uncertainties are presented in the journal paper [JR.19] (**Journal of Systems and Software**) and in the conference papers [IC.25] and [IC.19], respectively.

The research challenges and possible research directions in the field of self-adaptive have been explored in [IB.10] and [IB.5] [IB.6], [IB.2].

## MODEL- DRIVEN SOFTWARE ENGINEERING

*Model-driven development* (MDD) is a discipline that tries to systematize model-based software development. The goal of MDD is twofold. On the one side, it aims at deriving (automatically or semi-automatically) a software implementation, starting from high-level models of the system and applying model transformation rules which refine high-level descriptions into more concrete and specific models. On the other, it aims at supporting reasoning activities on the high-level models. Through an early analysis of quality properties, such as performance and reliability, the software engineer can evaluate the impact of the different design choices or candidate system architectures, before they are reified into runnable code.

**Scientific contributions** A first research contribution in this area is the definition of an UML profile for mobile software architectures and its usage for the analysis of quality requirements: [IC.79], [IC.70] and [IC.69]. Another result concerns the definition of a pivot language called KLAPER facilitating the definition and generation of analysis- oriented models (such as reliability models or performance models) starting from design-oriented models expressed in different formalisms, such as UML or BPMN, [IC.65],[IC.61],[JR.29],[IB.12], together with the possibility to deal with dynamic system environments [IC.60] and [IB.11]. A tool-suite has been built around this language and used in a set of academic and industrial case studies presented at the conferences [IC.40] (**TOOLS2011**, [IC.39] (**ICSE2011**) and in the **Software and System Modeling** journal [JR.17]. The obtained results are widely cited in the literature, see for example the citations of Google Scholar for the WOSP paper [IC.65] and the **Journal of Systems and Software** paper [JR.29].

A different challenging problem we have considered in the MDE area is called "feedback provisioning": how to propose solutions to non-experienced engineers and guide them in the selection of an appropriate one when issues concerning quality attributes are detected. In this context we have presented a general discussion of challenges and open issues [IC.31] and their application to a specific domain [IC.20], we have proposed a multi-modeling solution that leverages and extends existing model transformation techniques with constructs to

elicit the space of the alternative solutions and to bind quality properties to them, presented at **MODELS2011** conference [IC.37] and in the **Computer Science - Research and Development** journal [JR.24]. The model transformations themselves need to be verified and a testing technique has been proposed to this end in the **QUATIC2010** conference paper [IC.46] and in the **Innovations in Systems and Software Engineering** journal paper [JR.16].

Recently, we have started a research line exploring the definition of a DSL language for the specification of the managing part in self-adapting systems [IC.7]. Based on this language we are now defining a framework helping the development and verification of self-adapting systems [IC.6], [IC.4], [IC.3], and the **Journal of Systems and Software** [JR.2] .

## External research funding

### EUROPEAN RESEARCH PROJECTS

Principal Investigator for Politecnico

- FP7 European project Q-ImPRESS: "Quality Impact Prediction for Evolving Service-Oriented Software"

I contributed actively in the following research projects:

- H2020 CSA Dossier Cloud: Devops-based Software engineering for the cloud (Coordinator Cyprus University of Technology, Local PI Luciano Baresi)
- FP7 ICT SeaClouds: Seamless adaptive multi-cloud management of service-based applications (Coordinator: ATOS, Spain, Local PI Elisabetta Di Nitto)
- FP7 ERC-SMSCom: Self-Managing Situated Computing (ERC grantee Carlo Ghezzi, Politecnico di Milano)
- FP7 NOE S-Cube: Software Services and Systems Network (Coordinator University of Duisburg-Essen, Local PI Carlo Ghezzi)
- FP6-ICT CASCADAS: Component-ware for Autonomic Situation-aware Communications, and Dynamically Adaptable Services (Coordinator Telecom Italia, Local PI Elisabetta Di Nitto)
- FP6 ICT PLASTIC: Providing Lightweight and Adaptable Service Technology for pervasive Information and Communication (Coordinator Inria, France, Local CNR PI Antonia Bertolino)
- European Project "GAAS": Design and development of distributed Client/server Architectures for air traffic control systems (local Rome PI, Giuseppe Iazeolla)
- EUROCONTROL Project "PAMPAS": A preliminary approach to performance modelling and analysis of air traffic control systems (local Rome PI, Giuseppe Iazeolla)
- EUROCONTROL Project "EVAS: EATMS VALIDation Strategy" (local Rome PI Giuseppe Iazeolla)

### NATIONAL RESEARCH PROJECTS

I contributed actively in the following Italian research projects:

- PRIN 2012 IDEAS - Integrated Design and Evolution of Adaptive Systems, (Local PI Carlo Ghezzi)
- PRIN 2008 DASAP: Architetture Software Adattabili e Affidabili per Sistemi Pervasivi, (Local PI Carlo Ghezzi)
- FIRB Programmi Strategici 2005: ART DECO (Adaptive InfRasTructures for DECentralized Organizations), (Local PI Carlo Ghezzi)
- FIRB - PERF (2002 - 2006) Performance Evaluation of Complex Systems: Techniques, Methodologies and Tools,(Local Rome PI Vincenzo Grassi)

- PRIN 2001 SAHARA Software Architectures for Heterogeneous Access Infrastructures, (Local Rome PI Vincenzo Grassi)
- PRIN 1999 SALADIN: Software Architectures and Languages to Coordinate Mobile Distributed Components, (Local Rome PI Vincenzo Grassi)
- Certia-CERC Project "Software Process Optimization and Collaborative Environments for Software V&V" (Rome PI, Giuseppe Iazeolla)
- CNR Project "Performance and Reliability Engineering of Distributed Databases"
- ITALIAN MURST Project "Performability V&V of Product and Processes in Software Engineering"

## Other academic qualification

### EDITORIAL BOARDS

- Special Issue co-Editor Journal of System and Software, Elsevier (2019-present)
- Editorial Board of:
  - IEEE Transaction on Software Engineering (2014-present),
  - Journal of System and Software, Elsevier (2008-present).

### JOURNAL SPECIAL ISSUE EDITOR

- "Theme issue on performance modeling" *Journal of Software and Systems Modeling, Springer* Volume 12, no. 4, (2013)
- "New Frontiers in Software Architecture" *Journal of Systems and Software, Elsevier*, 2017; Vol. 130

### PROJECT REVIEWER

- Research projects for the "Netherlands Organisation for Scientific Research" in 2009 and 2012
- Research projects for the "Fundacao para a Ciencia e a Tecnologia", Portugal in 2012
- Research projects for the DFG priority program SPP 1593/1, Germany, in 2012
- Research projects for the DFG priority program SPP 1593/1, Germany, in 2015
- CLUSTER of EXCELLENCE projects, DFG, Germany, 2017, 2018

## Conference Organization

### Conference General (Co-)Chair

- European Conference on Software Architecture- ECSA 2021,
- Comparch 2012, federated conference including CBSE (International ACM Sigsoft Symposium on Component Based Software Engineering), QoSA (International ACM Sigsoft Conference on the Quality of Software Architectures) and ISARCS (International ACM Sigsoft Symposium on Architecting Critical systems).

### Conference Program (Co-)chair

- International Symposium on Software Engineering for Adaptive and Self-Managing Systems- SEAMS 2021
- European Software Architecture Conference - ECSA 2015
- ACM SAC Software Architecture: Theory, Technology, and Applications (SA-TTA) track (2013-2015)
- MOCS Model-based development, Components and Services Track at Euromicro SEAA Conference (2010-2012)

- ACM WOSP/SIPEW ICPE International Conference on Performance Engineering (2011)
- QoSA 2009: Fifth International Conference on the Quality of Software Architectures (2009)
- EUROMICRO Conference on Software Engineering and Advanced Applications (SEAA), 2008

### **Dagstuhl Seminars Co-organization**

- GI-Dagstuhl-Seminar: "Model-Driven Quality Prediction", November 2009
- GI-Dagstuhl-Seminar: "Modelling Contest: Common Component Modelling Example", August 2007

### **Other events organization**

- Doctoral Symposium chair at European Conference on Software Architecture- ECSA 2019
- Poster co-chair at IEEE/ACM International Conference on Software Engineering, ICSE 2018
- Doctoral Project track chair at the International Symposium on Software Engineering for Adaptive and Self-Managing Systems- SEAMS 2018:
- Co-organizer of the first workshop on Gender Equality in Software Engineering, ICSE 2018
- Workshop co-chair at the European Conference on Software Engineering - European Conference on Software Architecture- ECSA 2018
- Co-organizer of the Woman in Software Architecture Track at the European Conference on Software Architecture-ECSA 2017
- Workshop co-chair at the IEEE/ACM International Conference on Software Engineering - ICSE 2015
- Co-organizer of QUOVADIS: First International workshop on Quantitative Stochastic Models in the Verification and Design of Software Systems, Workshop at ICSE 2010
- Workshop chair of IEEE ASE 2008: International Conference on Automated Software Engineering, 2008
- Panel organizer: "SOA and Quality Assurance" at SEAA 2008
- Workshop organizer NfC – Models for Non-functional Aspects of Component-Based Software, Models 2005

### **Steering Committees**

I serve on the Steering Committee of the following conferences:

- ICPE: ACM International Conference on Performance Engineering
- ICSA: IEEE International Conference on Software Architecture
- ECSA, The European Conference on Software Architecture
- SEAMS: The International Symposium on Software Engineering for Adaptive and Self-Managing Systems (IEEE/ACM)

### **Program Committee Membership**

Starting from 2002 until now I have been serving in the program committee of several conferences, among which:

- ICSE: the IEEE/ACM International Conference on Software Engineering
- ICPE: the ACM International Conference on Performance Engineering
- ICSA: the IEEE International Conference on Software Architecture
- ECSA: the European Conference on Software Architectures
- SEAMS: the International Symposium on Software Engineering for Adaptive and Self-Managing Systems
- MODELS: the ACM/IEEE International Conference on Model-Driven Engineering Language and Systems
- SEAA: the Euromicro Conference on Software Engineering and Advanced Applications



## REFeree SERVICES

I regularly serve as a reviewer for several journals, among which: Performance Evaluation, Elsevier, Journal of System and Software, Elsevier, IEEE Transaction on Software Engineering, Software and System Modeling-Springer, ACM transactions on software engineering and methodology, IEEE Transactions on Dependable and Secure Systems, IEEE Transactions on Service Computing, Future Generation of Computer Systems, Elsevier, Journal of Software: Evolution and Process, Wiley, Computing Springer, Science of Computer Programming, Elsevier, Information and Software Technology, Elsevier

## INVITED TALKS

- "Software QoS enhancement through self-adaptation and formal models" invited lectures at GSSI, L'Aquila, Italia, April 2015
- "Software Performance Engineering In and For Dynamic Environments", Keynote at ECSA 2011, Essen Germany, September 2011 (<http://www.ecsa2011.org/>)
- "A journey across three decades of software performance engineering approaches" Keynote at Palladio-Days 2011, Karlsruhe, Germany November 2011 (<http://www.palladio-days.org/2011/programme/>)
- "Software Performance Engineering In and For Dynamic Environments" Seminar at Milano Bicocca, PhD Course, 2 December 2011
- "Tecniche di valutazione di requisiti di performance e reliability per il software", Invited talk, Workshop CDE V&V Intecs, 25 November 2011
- "Some issues about modeling of mobile software architecture", Invited presentation at UML 2004 Workshop on "Software Architecture Description and UML", 12 October 2004

## TUTORIALS

- "Software QoS enhancement through self-adaptation and formal models" at QoSA'14, the 10th International ACM SIGSOFT Conference on Quality of Software Architectures (part of CompArch 2014), June 30 - July 04, 2014, Lille, France (with Diego Perez-Palacin)
- "Performance Validation of mobile software architecture" at PERFORMANCE 2002 IFIP WG 7.3 International Symposium on Computer Performance Modeling, Measurement and Evaluation, Roma, Italy, September 2002 (with V. Cortellessa and V. Grassi)
- "Performance Validation of mobile software architecture" at the Fourth International Workshop on Software and Performance, WOSP 2004, ACM, January 14-16 2004, Redwood Shores, CA, USA (with V. Cortellessa and V. Grassi)

## Teaching experience

For all the courses presented in the list, whenever not differently indicated, I have been both Lecturer and Examiner.

- **Distributed Software Development, 2013-2020** (5 credits) - Master of Science, Computer Engineering, Politecnico di Milano, Course offered together with the University of Zagreb and Malarladen University, Vasteras, Sweden.
- **Fundamental of Computer Science, (2017-2020)** (10 credits)- Undergraduate Programme, ICT Engineering, Politecnico di Milano
- **Impianti e Servizi Informatici (2016-2020)** (10 credits)- Undergraduate Programme, Computer Engineering, Laurea On Line, Politecnico di Milano.
- **Computer Infrastructures, 2015-2017** (5 credits) - Master of Science, Computer Engineering, Politecnico di Milano

- **Software Engineering II (2010-2016)** (5 credits)- Master of Science, Computer Engineering, Politecnico di Milano
- **Impianti Informatici (2008-2015)** (5 credits)- Undergraduate Programme, Computer Engineering, Politecnico di Milano, Cremona Campus.
- **Fundamental of Computer Science, (2005-2010)** (10 credits)- Undergraduate Programme, Management and Production Engineering, Politecnico di Milano
- **Fondamenti di Informatica II (2003-2005)**, (10 credits)- Undergraduate Programme, Computer Engineering, University of Roma Tor Vergata
- **Early validation of non-functional requirements in software systems** (2003-2004), - PhD Course at University of Roma Tor Vergata
- **Fondamenti di Informatica I, (1997-2004)** , (teaching assistant) (10 credits)- Undergraduate Programme, Computer Engineering, University of Roma Tor Vergata
- **Impianti Informatici (1997-2003)**,(5 credits) - Undergraduate Programme, Computer Engineering, University of Roma Tor Vergata
- **Simulazione (1990-1996)**, (teaching assistant) (10 credits)- Undergraduate Programme, Computer Engineering, University of Pisa

## Supervisor experience

- Advisors of several PhD and post-doc students in Computer Science and Engineering at Politecnico di Milano, 2007-Present
- Advisor of several undergraduate and Master students in Computer Engineering at Politecnico di Milano, 2006-Present
- Advisor of several Undergraduate and Master students in Computer Science at University of Roma Tor Vergata, 1997-2005

### PHD EXTERNAL EXAMINER

- PhD Committee member in 2019 at Malardalen University, Sweden, for the PhD defense of the candidate Nesredin Mahmud discussing a thesis titled "Design of Assured and Efficient Safety-Critical Systems", Advisor Prof. Cristina Seceleanu, Sr. Lect. Guillermo Rodriguez-Navas
- PhD Committee member in 2018 at Malardalen University, Sweden, for the PhD defense of the candidate Gabriel Campeanu discussing a thesis titled "GPU Support for Component-based Development of Embedded Systems", Advisor Prof. Jan Carlson
- PhD Committee member in 2018 at University San Paolo, Brasil, for the PhD defense of the candidate Lina Mara Garces Rodriguez discussing a thesis titled "A reference architecture for healthcare supportive home systems from a systems-of-systems perspective", Advisors Elisa Yumi Nakagawa (ICMC-USP) and Professor Flavio Oquendo (UBS).
- PhD Committee member in 2016 at Malardalen University, Sweden, for the PhD defense of the candidate Gaetana Sapienza discussing a thesis titled "Multiple Criteria Decision Analysis-based HW/SW partitioning methodology for embedded applications", Advisor Prof. Ivica Crnkovic, co-advisors: Prof. Tiberiu Seceleanu, Dr. Antonio Cicchetti.
- PhD Committee member in 2013 at University of Zaragoza, Spain, for the PhD defense of the candidate Diego Perez-Palacin discussing a thesis titled "Extra Functional Properties Evaluation of Self-managed Software Systems with Formal Methods", Advisor Prof. Jose' Merseguer
- PhD Committee member in 2013 at University of Calgary, Canada, for the PhD defense of the candidate Anas Youssef discussing a thesis titled "Burstiness and Uncertainty Aware Service Level Planning for Enterprise Clouds", Advisor Dr Diwakar Krishnamurthy

- External reviewer in 2013 for the habilitation as Associate Professor of Tomas Bures, Charles University, Prague, Czech Republic
- External reviewer 2012 for the PhD thesis of the candidate Indika Meedeniya titled "Architecture Optimisation of Embedded Systems under Uncertainty in Probabilistic Reliability Evaluation Model Parameters", Advisor Prof. Lars Grunske, Swiburne University, Australia
- PhD Committee member in 2012 at University of Lisbona, Portugal, for the PhD defense of the candidate Liliana Rosa discussing a thesis titled "Self-management of Systems Built from Adaptable Components", Advisor Prof. Luis Rodrigues, co-advisors: Prof. Antonia Lopes
- PhD Committee member in 2012 at Malardalen University, Sweden, for the PhD defense of the candidate Severine Santilles discussing a thesis titled "Managing Extra-Functional Properties in Component-Based Development of Embedded Systems", Advisor Prof. Ivica Crnkovic, co-advisors: Dr. Jan Carlsson, Prof. Hans Hansson
- PhD Committee member in 2010 at Malardalen University, Sweden, for the PhD defense of the candidate Kurt Wallnau discussing a thesis titled "Predictability By Construction: Working the Architecture/Program Seam", Advisor Prof. Ivica Crnkovic, co-advisors: Magnus Larsson, Hans Hansson

## Selected Publications

The paper selection reflects the results obtained in the different research lines. The contributions below are listed starting from the most recent ones. The authors are almost always listed in alphabetical order and they equally contributed to the development of the research and papers.

- M. D'Angelo, M. Caporuscio, V. Grassi, R. Mirandola "Decentralized Learning for Self-Adaptive QoS-Aware Service Assembly" *Future Generation Computer Systems, Elsevier*, on line first 2020, Scimago ranking: Q1 [doi: <https://doi.org/10.1016/j.future.2020.02.027>]
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Refereed international magazines	2
Editorial contributions	9
Refereed chapters in international books	16
Refereed international conferences	88
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Academic books	2

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