

# CURRICULUM VITAE

## GIANLUIGI GRECO

**HIGHLIGHTS.** Gianluigi Greco is a full professor of Computer Science and the Head of the Department of Mathematics and Computer Science at the University of Calabria. His research activities are grounded in the Artificial Intelligence area, and his main achievements come from the study of game-theoretic models for multiagent systems, mechanisms of opinion diffusion in social networks, knowledge representation and reasoning (in particular, logic programming and integration of knowledge bases), constraint satisfaction problems, and machine learning (in particular, analysis of event logs). The contributions that he gave to these fields range from new algorithms and theoretical results of different kind, to experimental analyses, implemented systems and innovative applications of AI techniques. He published more than 200 peer-reviewed research papers. In particular, he published in the top AI journals *Artificial Intelligence* (9) and *Journal of Artificial Intelligence Research* (4), as well as in the top AI conferences IJCAI (15), AAI (4), and ECAI (3). Moreover, he published AI results in some of the most prestigious venues for theoretical computer science, computational logics, database theory, and machine learning, including: *Journal of the ACM*, *SIAM Journal on Computing*, *Journal of Computer and System Sciences*, *ACM Transactions on Computation Theory*, *ACM Transactions on Database Systems*, *ACM Transactions on Computational Logics*, and *ACM Transactions on Knowledge Discovery from Data*. His research activities received some prestigious awards, including the **2022 AAIA Fellowship**, the **2020 EurAI Fellowship**, the **2018 IJCAI Distinguished Paper Award**, the **2014 Kurt Gödel Fellowship Award** in the area “Logical Foundations of Artificial Intelligence”, the **2009 Marco Somalvico Award** as the best Italian young researcher in AI, and the **2008 IJCAI-JAIR Best Paper Prize**. He is/was the scientific responsible of a number of research and industrial projects focusing on AI methods and technologies, and he is co-founder of two spin-offs offering ICT solutions equipped with advanced reasoning capabilities. He has served the international AI community in various ways. In particular, he is currently Associate Editor of the *Artificial Intelligence* journal and he is the **President of the Italian Association for Artificial Intelligence** and he is Member of the Board of Directors of the Italian Association for Ethics in AI.

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### PERSONAL INFORMATION

Born: October 28, 1977, Cosenza, Italy  
Academic Position: Full Professor of Computer Science  
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### CURRENT POSITION

- President of the Italian Association for Artificial Intelligence (since 2022).
- Head of the Department of Mathematics and Computer Science at UniCal (since 2018).
- Coordinator of the “Digital transformation and Technology Transfer” spoke—with EUR ~17.5M budget—of the Tech4You Ecosystem (since 2022).
- Member of the Board of Directors of the Italian Association for Ethics in AI (since 2023).
- Member of the Academic Senate at UniCal (since 2018).
- Member of the AGENAS (National Agency for Regional Health Services) Working Group on Artificial Intelligence, currently involved in the definition of a national artificial intelligence platform for primary healthcare (since 2022).
- Member of the ethics committee of the PRO.DI.GI.T project for the digitalization and creation of innovative services to support the Tax Justice of the Ministry of Economy and Finance (since 2022).
- Member of the Scientific Board of AssoFintech, the Italian Association for Fintech, Insurtech, and PropTech (since 2022).
- Member of the Scientific Board of the “Polo Pitagora”, the innovation hub of the Calabria Region dedicated to support the growth of the ICT sector (since 2021).

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## OTHER ACADEMIC AND RESEARCH APPOINTMENTS

- 2019→2022 Director of the PhD Program in Mathematics and Computer Science at UniCal.
- 2018→2021 Director of the CINI - “National Interuniversity Consortium for Informatics” - Research Unit at UniCal.
- 2017→2020 Member of the Technical and Scientific Committee of the “Centro Linguistico” at Unical.
- 2015→2017 Coordinator of the Quality Assurance Unit (Presidio di Qualità dell’Università) at UniCal.
- 02/2012→10/2017: Associate Professor of Computer Science at UniCal.
- 2014: Invited Professor at the University of Paris-Dauphine.
- 2007→2008: Research Associate at the ICAR institute of the National Research Council (CNR).
- 2006: Visiting researcher at the Oxford University Computing Laboratory.
- 01/2005→01/2012: Assistant Professor of Computer Science at UniCal.
- 2001→2004: PhD studies at UniCal, and visiting at the Vienna University of Technology.
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## MAIN RESEARCH AREAS

His research interests span over a wide spectrum of AI fields, in particular,

- Game-theoretic models for multiagent systems: strategic games, coalitional games;
- Allocation problems: combinatorial auctions, mechanism design;
- Opinion diffusion: competitive models, logic-based models, simulations over social networks;
- Knowledge representation and reasoning: logic programming, integration of knowledge bases, complexity of reasoning, temporal reasoning;
- Constraint satisfaction: structural decomposition methods, algorithms based on local consistency, optimization, applications to query evaluation in databases;
- Machine learning: learning methods for event logs, applications of unsupervised learning methods.

His contributions to these fields range from new algorithms and theoretical results of different kind, to experimental analyses, implemented systems and innovative applications of AI techniques.

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## PRIZES AND AWARDS

- 2022: He received the **AAIA Fellowship** awarded by the Asia-Pacific Artificial Intelligence Association. The AAIA Fellows program was initiated to recognize individuals who have made significant contributions to the field of artificial intelligence (AI) worldwide.
- 2019: He received the **EurAI Fellowship** awarded by the European Association for Artificial Intelligence. The EurAI Fellows program was initiated in 1999 to recognize individuals who have made significant, sustained contributions to the field of artificial intelligence (AI) in Europe. The EurAI Fellows Program honors only a very small percentage of the total membership of all EurAI member societies (up to a maximum of 3%).
- 2019: His work “Reasoning about Consensus when Opinions Diffuse through Majority Dynamics”, co-authored with V. Auletta and D. Ferraioli, received the **IJCAI Distinguished Paper Award** at the 27th International Joint Conference on Artificial Intelligence (7 distinguished papers have been selected out of 710 accepted papers, and 3470 submissions). The work analyzes dynamics of opinion diffusions in a setting where agents hold binary opinions and where social pressure leads them to conform to the opinion manifested by their friends. Within this setting, the work studies questions related to whether a minority/majority can spread the opinion it supports to all other agents.
- 2016: His work “Hypertree Decompositions: Questions and Answers”, co-authored with G. Gottlob, N. Leone, and F. Scarcello, has been invited and presented at the **Gems of PODS** event, which features topics and results that have been highly influential in the community of the Symposium on Principles of Database Systems and beyond. The work overviews the contributions made by the authors to develop methods, algorithms, and systems based on the concept of hypertree decomposition with the aim of identifying islands of tractability to the query evaluation problem. It is well-known that this problem is equivalent to the Constraint Satisfaction Problem, so that all results derived in the database context are very relevant from the AI perspective, too.

- 2016: His work “Coalition Formation with Logic-Based Agents”, co-authored with A. Guzzo, has been selected as one of the best papers presented at the 4th International Conference on Agreement Technologies. An extended version has been invited and then published in the AI Communications journal. The work studies reasoning problems related to coalition formation, in a setting where agents take part to a group decision-making scenario and where their preferences are expressed via weighted propositional logic.
- 2014: He received the **Kurt Gödel Fellowship Award** in the category “Logical Foundations of Artificial Intelligence”, with a ceremony at the Vienna Summer of Logic event (the largest event in the history of logic, consisted of twelve large conferences and numerous workshops). The fellowship award—in the amount of EUR 100.000,00—has been financed by the John Templeton Foundation, and was intended to carry forward the legacy of Kurt Gödel, whose works exemplify deep insights and breakthrough discoveries. The award has been assigned based on a world-wide open competition.
- 2009: He received the **Marco Somalvico Award** with a ceremony at the 13th Symposium of the Italian Association for Artificial Intelligence. This is the most prestigious prize awarded by the Italian Association for Artificial Intelligence (AI\*IA), and it is meant to celebrate the best young Italian researcher in Artificial Intelligence.
- 2008: His work “Pure Nash Equilibria: Hard and Easy Cases” received the **IJCAI-JAIR Best Paper Prize**, with an award ceremony at the 23rd AAAI Conference on Artificial Intelligence. This prize is annually awarded to an outstanding paper published in the Journal of Artificial Intelligence Research in the preceding five calendar years. The work analyzes the problem of computing Nash equilibria from the computational viewpoint, by focusing on pure strategies where agents chooses to play their actions in a deterministic, non-aleatory manner. The prize committee felt that: *The paper provides a set of fundamental complexity results in the area of strategic games. The results and techniques have a broad scope and are of interest not only in AI but also in Economic Theory and Computer Science.*
- 2008: His work ‘Discovering multi-perspective process models’, co-authored with F. Folino, A. Guzzo, and L. Pontieri, has been selected as the best paper at the 10th International Conference on Enterprise Information Systems, for the area Artificial Intelligence and Decision Support Systems. The paper describes a novel machine learning method to identify execution classes of some given process, based on structural and non-structural properties of the activities registered in the log at hand.
- 2007: His work “On the complexity of combinatorial auctions: structured item graphs and hypertree decomposition”, co-authored with G. Gottlob, has been selected by the editor of SIGecom exchanges (official newsletter of the ACM Special Interest Group on Electronic Commerce) as one of the best papers of the year on the topic of multiagent coordination via auction mechanisms, and an abstract has been invited in a special issue of the newsletter. The paper studies algorithmic and complexity issues for the winner determination problem in combinatorial auctions, by solving a number of questions that were open in the literature. A revised and improved version of this work later appeared in the Journal of the ACM.
- 2006: His work “An Information-Theoretic Framework for Process Structure and Data Mining”, co-authored with A. Chiaravalloti, A. Guzzo, and L. Pontieri, has been selected as one of the best papers at the 8th International Conference on Data Warehousing and Knowledge Discovery. An extended version has been invited and then published in the International Journal of Datawarehousing and Mining. The paper describes a co-clustering framework for event logs, tailored to identify process variants suited to support design and optimization tasks.
- 2006: His work “Solving Abduction by Computing Joint Explanations: Logic Programming Formalization, Applications to P2P Data Integration, and Complexity Results” has been selected as one of the best paper at the 4th International Symposium on Foundations of Information and Knowledge Systems. An extended version has been invited and then published in the Annals of Mathematics and Artificial Intelligence journal. The paper analyzes and abductive framework to solve conflicts arising from merging knowledge bases in a peer-to-peer context.
- 2005: His work “Magic Sets and Their Application to Data Integration”, co-authored with W. Faber and N. Leone, has been selected as one of the best database-theory papers of the year, and an extended version has been invited and then published in the Journal of Computer and System Sciences. The work proposes an extension of the magic-set method to logic programs with negation, and discusses its application to optimize the evaluation of logic programs used to compute consistent query answers in data integration settings.
- 2004: His work “Weighted Hypertree Decompositions and Optimal Query Plans”, co-authored with N. Leone and F. Scarcello, has been selected as one of the best database-theory papers of the years 2003 and 2004, and an extended version has been invited and then published in the Journal of Computer and System Sciences. The work introduces the notion of weighed hypertree decomposition as an extention of the hypertree decomposition method to single out islands of traceability to the query evaluation problem (hence, to the constraint satisfaction problem).

- 2002: His work “A Stochastic Approach for Modeling and Computing Web Communities”, co-authored with S. Greco and E. Zumpano, has been selected as one of the best papers at the 3rd International Conference on Web Information Systems Engineering. An extended version has been invited and then published in the World Wide Web Journal. The work describes an approach to model and reason about the formation of web communities,
- 2001: His work “A Probabilistic Approach for Discovering Authoritative Web Pages”, co-authored with S. Greco and E. Zumpano, has been selected as one of the best papers at the 2nd International Conference on Web Information Systems Engineering. An extended version has been invited and then published in the World Wide Web Journal. The work describes a method to rank web pages depending on their relevance computed for a topic of interest.

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## MAIN RESEARCH RESULTS

Selected results of his scientific achievements in form of short abstracts are listed below.

**GAME-THEORETIC MODELS FOR MULTIAGENT SYSTEMS:** He has been conducting research on this topic since 2003 and, over the years, he had significantly contributed to spread in the Artificial Intelligence community notions and methods borrowed from the game theory literature. Nowadays, models of strategic and cooperative behaviour taken from game theory are widely accepted as useful abstractions to reason about agents’ interactions in multiagent systems. In this context, he studied many *solution concepts* with the aim of assessing their intrinsic computational complexity and developing effective algorithms for their computation, and he solved various problems that were open in the literature.

Concerning the strategic setting (where agents are self-interested), he studied the complexity of *Nash equilibria* (and variants) in cases where agents are forced to choose their actions in a non-aleatory manner [JAIR-05], as well as in cases where actions are played according to probability distributions [IJCAI-07, TCS-09]. His results have been very influential in the literature. For example, some of them are described in the Compendium “Completeness in the Polynomial-Time Hierarchy: A Compendium”, maintained by Schaefer and Umans. Other results were discussed by David S. Johnson in his famous “NP-Completeness Column” [ACM Transactions on Algorithms, Vol. 3, No. 2, Article 24, May 2007]. The depth of his research in this area is also witnessed by the fact that his work [JAIR-05] was honored in 2008 with the prestigious “IJCAI-JAIR Best Paper Award”, which is annually awarded to an outstanding paper published in the Journal of Artificial Intelligence Research in the preceding five calendar years.

Concerning the cooperative setting (where agents can form coalitions in order to obtain higher worths than by acting in isolation), he put under lens of computational complexity and algorithmic design most of the worth distribution mechanisms proposed in the literature to capture requirements of fairness and stability. In particular, over arbitrary kinds of games as well as over specific subclasses, he studied: the *core*, the *kernel*, and the *bargaining set* [IJCAI-09b, AAMAS-09, JAIR-10, IJCAI-11, AIJ-11, IJCAI-16]; the *nucleolus* [TOCT-14]; and the *Shapley value* [IJCAI-15a, IJCAI-17, AIJ-20]. Moreover, he studied settings where some coalitions might not be allowed to form, because of the existence of constraints on the legal coalitions that can be modeled either in terms of connectivity properties on the underlying interaction graph [AIJ-16] or in some logic-based language [AIJ-17, IJCAI-18]. These works are well-known in the AI community. In particular, his work [AIJ-11] appeared for five consecutive months in the list of the most downloaded articles of the Artificial Intelligence journal. Moreover, his work [AIJ-16] appeared in the list of the most cited articles of the *Artificial Intelligence* journal for the period 2016→2019.

**ALLOCATION PROBLEMS:** He studied formal methods and algorithms to analyze and solve resource/task allocation problems. In particular, he studied representation and complexity issues related to combinatorial auctions [EC-07, JACM-13], which are well-known mechanisms where agents are allowed to express (numerical/monetary) preferences on combinations of items, and to extensions where agents can even trade bundles of items to sell and of transformations of items [IJCAI-09a, AIJ-13]. Moreover, he considered settings where allocations have to be perceived as fair ones by all agents [IJCAI-13, JAIR-14]. These results had a significant impact both in theory and in practice. His work [JACM-13] is an extension of [EC-07], which has been selected by the editor of SIGecom exchanges (official newsletter of the ACM Special Interest Group on Electronic Commerce) as one of the best papers of the year on auctions. This work solved an open problem in the literature related to the structural tractability of combinatorial auctions, by proposing techniques whose scope of applicability goes beyond auctions and encompasses set-packing problems and independent-set problems. Finally, it must be observed that his work [JAIR-14] defines the formal foundations on top of which other authors build practical allocation mechanisms suited to deal with real-case scenarios; for instance, they have been used by M. Schaerf and his group to analyze the VQR (italian) research assessment program.

**OPINION DIFFUSION:** Understanding how global behavior emerges from local interactions among individuals is a well-established topic of research in a number of different areas, including economics, finance, epidemiology, social psy-

chology, and political science. More recently, due to the rapid proliferation of social networking services, such as facebook and Twitter, which created novel and highly-dynamic forms of techno-social ecosystems, computer scientists have been fascinated by the problem too. Within this context, he has recently approached the study of dynamics of opinion diffusion in settings where agents are equipped with rather expressive logical theories [AAMAS-17] as well as in settings where agents can just hold binary opinions [IJCAI-18, AIJ-20] or three opinions [TCS-21]. The results he derived for the latter case are particularly interesting, as they precisely characterize the conditions under which some minority/majority can spread its opinion to the whole network by exploiting social pressure mechanisms. The algorithms that have been proposed can be useful in the context of viral marketing in order to define the most appropriate seeds for a marketing campaign. The AI relevance of these results is witnessed by the IJCAI Distinguished Paper Award assigned to [IJCAI-18].

**KNOWLEDGE REPRESENTATION AND REASONING:** His contributions to this field can be grouped in two categories.

First, he was interested in logic programming and in applications. In particular, he studied non-standard semantics for logic programs with unstratified negation and disjunction. He worked on the definition of optimization strategies for logic programs, by extending the magic sets method to disjunctive programs with integrity constraints, with unstratified negation [JCSS-07a], and with disjunction [AIJ-12]. Moreover, he studied the application of these optimization methods and, more generally, of logic-programming techniques to a number of concrete domains. For instance, he proposed and analyzed a logic-programming approach to resolve conflicts arising from the integration of different knowledge bases, in presence of integrity constraints specified in various fragments of first order logic [TKDE-03, TODS-05]. These works are well-known in the community, and their relevance has been widely recognized. In particular, the extension of the magic set method to programs with disjunction was first presented at the ICDT conference, and then disseminated as a nectar paper at the AAAI conference on artificial intelligence [AAAI-08]. His work [JCSS-07a] has been invited in a special issue of the Journal of Computer and System Sciences collecting the best database-theory papers of the year. Furthermore, the logic-programming approach to conflict resolutions significantly contributed to the renewal of interest in logic-programming based paradigms as vehicles to implement solutions in concrete application domains. Indeed, his work [TKDE-03] received more than 180 citations, and it constituted one of the key ingredients leading to the implementation of the INFOMIX information integration system [SIGMOD-05], which was the main outcome of the EU FP5 project “INFOMIX: boosting information integration”.

Second, he carried out several studies on the computational complexity of reasoning. For example, he focused on the identification of outliers from logical theories [TOCL-07], on problems related to workflow systems [TKDE-05], on group reasoning problems [IJCAI-15b, IJCAI-13, IJCAI-15b], in particular when suitable notions of fairness have to be taken into account, and on reasoning over RDF data [AAAI-15] and event data [AAAI-16, JAIR-18]. In most cases, the specific application domains on which reasoning problems have been considered emerged from real cases and AI projects carried out with industrial partners. Indeed, assessing the intrinsic complexity of the reasoning tasks arising therein served to identify classes of tractable instances and to guide specific algorithmic methods for computing solutions on arbitrary instances. A domain that has a specific industrial relevance is the one related to reasoning about event logs, where he studied the theoretical underpinnings of Linear Temporal Logic applied over finite traces and for which he designed and guided the implementation of a prototype reasoner engine, named LTL2SAT, supporting natively this logic. In fact, Linear Temporal Logic applied on finite traces plays an important role in the context of business processes, as it serves an abstraction of well-known declarative-based specification languages.

**CONSTRAINT SATISFACTION:** He studied methods to identify classes of tractable constraint satisfaction problem (CSP) instances, based on the analysis of their structural properties, such as treewidth and hypertree width [AIJ-10, PODS-10, TCS-14, PODS-16, INFCOM-17]. He focused not only on the classical problem of deciding whether there is a solution, but he also considered the problems of enumerating/counting all solutions [PODS-14] and of computing optimal solutions [JCSS-18]. Moreover, he characterized expressiveness and complexity of CSP extensions, in particular of fragments of first-order logic with arbitrary quantifications [IJCAI-05] and with the implication connective “ $\rightarrow$ ” [IJCAI-07b]. Since CSP instances can be equivalently viewed as logical sentences in the  $\exists FO_{\wedge,+}$  fragment of first-order logic (that is, as existentially quantified first-order formulas with no negations or disjunctions), the results have a broader applicability. In particular, solving CSPs is known to be equivalent to answering Boolean conjunctive queries—hence, it comes with no surprise that some of his results in the area have been published in top database conferences, but have a clear applicability in AI too. Note that a practical solver, implementing the results of his research, has been made available to the community [PODS-04, ICDE-07]. The research conducted on this topic has been widely influential in the literature, and has been presented at the Gems of PODS event, which features topics and results that have been highly influential in the community of the Symposium on Principles of Database Systems and beyond.

More recently, he initiated another program of research aimed at characterizing the precise power of some heuristic approaches used to solve CSP instances. For example, for many well-known classes of instances, such as for the acyclic

ones, methods based on enforcing local consistency are sufficient to solve the given instance correctly. However, the precise power of these procedures was unclear, but for some very restricted cases. The first relevant steps in the area come as answers to a number of long-standing questions about such local-consistency based methods [SICOM-17].

**MACHINE LEARNING:** He studied methods for learning predictive models and for unsupervised learning, which are specifically designed to deal with event data originated from dynamic environments and (business) processes [TKDE-05, TKDE-06, TKDD-15], from biological data [TKDE-08], and from multi-dimensional data [TKDE-10]. Most of these results were applied in AI projects and the proposed algorithms have been implemented in system prototypes made available to the community. His work [TKDE-05] has been very influential, by collecting about 320 citations. This work has been the first attempt to use an unsupervised learning methods to identify the variants of the process, based on the logs registered by some transactional systems. The approach stimulated many subsequent papers, and played an important role in establishing the process mining community—as it is witnessed by the fact that he served as PC member of the BPI workshop for 13 years. The algorithms described in [TKDE-05] have been made available to the community as a plug-in of the well-known ProM system developed at the Eindhoven University of Technology.

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## SCIENTIFIC COLLABORATIONS

He carried out his research in collaboration with many AI researchers. His DBLP page lists more than 60 co-authors who are either members of the Artificial Intelligence group at Unical, or members of other national and international groups. Intense collaborations are/were with the “AGATE Group” at the University of Salerno, with the “ICAR institute” of the Italian National Research Council, with the “Information Systems Group” at the University of Oxford, and with the “Knowledge Based Systems Group” at the Vienna University of Technology. He also collaborated with the “Business Management group” at the Eindhoven University of Technology and with the “LAMSADE” group at the University of Paris-Dauphine.

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## SERVICE FOR THE SCIENTIFIC COMMUNITY

- **Program chair** of the 18th International Conference of the AI\*IA (2019).
- **Program committee member** of more than 80 international conferences/workshops, including: IJCAI (2009, 2011, 2015-SPC, 2016-SPC, 2019-SPC, 2020-SPC, 2021-SPC, 2022-SPC), AAAI (2007, 2011, 2012, 2014→2022), ECAI (2006, 2014, 2020), PODS (2012, 2015), AAMAS (2008, 2010→2014, 2021), EC (2010, 2018), BPM (2016, 2018, 2019), GAIW (2019), FAMAS(2019), GCAI (2015→2018, 2020), FOIKS (2012, 2014, 2016), AGT (2015, 2017), WINE (2011), SUM (2011, 2012), CoopMAS (2011, 2012, 2013, 2014), WINE (2011), CILC (2012), BPI (2005→2017), KDIR (2010), ESWC (2008, 2009), KES (2008, 2009), RR (2008, 2013), ICSSM (2008), IPM (2008), ICSW (2007), ASWC (2007), IADC (2007), NMR (2006).
- **Associate editor** of the *Artificial Intelligence* journal (since 2021).
- Member of the **editorial board** of the journals: *Intelligenza Artificiale* (since 2016), *Advanced Studies in Artificial Intelligence* (2012→2015), *Advances in Computer Science and Engineering* (2010→2012), *International Scholarly Research Notices* (2014→2017), and *Scientific Programming* (since 2014).
- **Editor** of the proceedings of the 8th International Conference on Logic Programming and Nonmonotonic Reasoning, and of the proceedings of the 18th International Conference of the AI\*IA.
- **Organization committee member** of the conferences: European Conference on Logics in Artificial Intelligence (JELIA) 2002, Italian Symposium on Advanced Database Systems (SEBD) 2003, International Conference on Logic Programming and Nonmonotonic Reasoning (LPNMR) 2005, and Convegno Italiano di Logica Computazionale (CILC) 2010.
- **Reviewer** for many journals, including: *Artificial Intelligence Journal*, *Journal of Artificial Intelligence Research*, *Journal of the ACM*, *SIAM Journal on Computing*, *ACM Transactions on Economics and Computation*, *IEEE Transactions on Knowledge and Data Engineering*, *Logical Methods in Computer Science*, *Journal on Autonomous Agents and Multi-Agent Systems*, *AI Communications*, *Journal of Logic and Computation*, *Information Systems*.
- Member of the **award committees** for the *Leonardo Lesmo* award (with the role of **chair**) assigned by the Italian Association for the Artificial Intelligence, and for the *best PhD dissertation in theoretical computer science* assigned by the Italian Chapter of the European Association for Theoretical Computer Science.
- **Expert evaluator** of projects in a number of national and international founding programs, including: *Fondecyt 2016* programme (promoted by the Chilean National Science and Technology Commission), and *Physical Sciences TOP-grants 2013* programme (promoted by the Netherlands Organisation for Scientific Research).

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## INVITED TALKS (INTERNATIONAL WORKSHOPS/CONFERENCES)

- “Nash Equilibria under the lens of Computational Complexity”. Talk at the *Variational Inequalities, Nash Equilibrium Problems and Applications* Workshop, Reggio Calabria (Italy), 2018.
- “Compact Coalitional Games”. Talk at the *Gran Sasso Science Institute Meeting on Algorithms, Games and Markets*, L’Aquila (Italy), 2017.
- “Mechanisms with Verification and Fair Allocation Problems”. Keynote talk at the *ICTCS conference*, Lecce (Italy), 2016.
- “Game Theory for Society and Economics”. Keynote talk at the *Doctoral Consortium of the International Conference of the AI\*IA*, Pisa (Italy), 2014.
- “Mechanisms for Fair Allocations of Indivisible Goods”. Talk at the *Algorithmic Game Theory* Workshop of the Institute of Mathematical Science, Singapore, 2013.
- “Process Mining in Complex Domains”. Talk at the *Information (Computational) Systems in the Big Data Era* Workshop, Eindhoven (Netherlands), 2012.
- “Nucleolus Computation in Compact Coalitional Games”. Talk at the *Dagstuhl Seminar on Equilibrium Computation on Equilibrium Computation*, Dagstuhl (Germany), 2010.
- “Game Theory and Computer Science: Applications, Representation Issues and Complexity Results”. Talk at the *Computer Science Seminar Series of the Free University of Bolzen*, Bolzano (Italy), 2004.
- “Optimization Strategies in the INFOMIX System”. Talk at the *ARISE Workshop on Exchange and Integration of Data*, Toronto (Canada), 2004.

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## TUTORIALS (INTERNATIONAL WORKSHOPS/CONFERENCES)

- “AI and Healthcare”. Tutorial given at the *Bertinoro International Spring School*, Bertinoro (Italy), 2023.
- “Cooperative Games in Structured Environments”. Tutorial given at the *European Agent Systems Summer School*, Gdańsk (Poland), 2017.
- “Game theoretic techniques for mechanism design”, “Computational complexity of solution concepts” and “Structural decomposition methods and applications to game theory”. Tutorials given at the *Game Theory and Algorithms Summer school*, Campione d’Italia (Italy), 2015.
- “Mechanism Design and Fair Allocation Problems” and “The Italian Research Assessment Program”. Tutorials given at the *Fair Division Summer School*, Grenoble (France), 2015.
- “Structural Decomposition Methods and Islands of Tractability for NP-hard Problems”. Tutorial given at the *International Joint Conference on Artificial Intelligence - IJCAI*, Beijing (China), 2013.
- “Structural Decomposition Methods for Game Theory”. Tutorial given at the *Algorithmic Game Theory Invernal School*, Singapore, 2013.
- “Graph-Based Methods for Problem Decomposition”. Tutorial given at the *International Conference on Principles of Knowledge Representation and Reasoning - KR*, Roma (Italy), 2012.
- “Structural Decomposition Methods: Identifying easy instances of hard problems”. Tutorial given at the *International Conference on Inductive Logic Programming - ILP*, Firenze (Italy), 2010.

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## TEACHING ACTIVITIES

At UniCal he has been teaching BSc and MSc courses since 2000, most of them focusing on AI topics. In particular, he is/was responsible of the following courses:

- BSc teaching course “Linguaggi e logiche per l’informatica”/“Logics and formal languages” (18 academic years, since 2003). The course presents the basics of propositional logics and inference in logic-based systems.
- MSc teaching courses “Algorithmic Game Theory” (since 2021). The course is devoted to illustrate the basic notions of computational social choice, mechanism design and coalitional games.

- MSc teaching courses “Machine Learning” (since 2018). The course is specific for the AI MSc curriculum and it is entirely devoted to illustrate advanced machine learning methods, including deep learning architectures.
- MSc teaching courses “Modelli informatici e strategie di comunicazione”/“Communications models and strategies” (since 2015). The course overviews machine learning methods to analyze data for designing effective communication campaigns, and introduces the paradigm of game-theory to analyze strategic communication scenarios.
- MSc teaching courses “Modelli statistici per la customer satisfaction”/“Statistical models for customer satisfaction” (2 academic years, since 2017)
- BSc teaching courses “Interfacce grafiche e programmazione ad eventi”/“Graphical user interfaces” (8 academic years, since 2010),
- BSc teaching courses “Programmazione avanzata”/“Advanced computer programming” (8 academic years, since 2003).
- BSc teaching courses “Sistemi informativi per il web”/“Web information systems” (4 academic years, since 2011).

Moreover, at UniCal he organized several education initiatives in AI, such as collaborations with companies and startups to host PhD, MSc and BSc students to work on AI projects.

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## SUPERVISION OF STUDENTS AND YOUNG AI RESEARCHERS

He supervised a number of PhD and postdoc students working in AI, including Valeria Fionda (now associate professor at UniCal), Marek Adrian (now industry employee), Luigi Granata (now industry employee), Francesco Lupia (now industry employee), and Lucantonio Ghionna. He is currently supervising three PhD students and two postdocs. He also supervised more than 90 BSc and MSc theses in AI topics.

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## FUNDED AI PROJECTS

A substantial part of his activities in AI has been carried out in the context of research projects funded by EU, Italian Ministry of Education University and Research (MIUR), and Regione Calabria. In particular, he is/was:

- Scientific responsible of the Spoke on “Digital Transition and Technology Transfer” of the “Tech4You Ecosystem” (Bando MUR Ecosistemi dell’Innovazione, budget of the Spoke: EUR ~17.5M, since 2022).
- Scientific responsible of the project “Explora Process” (POR Calabria FESR-FSE, EUR ~797K, since 2017). The project is aimed at developing a platform to reason about event logs, which supports machine learning tasks and inference mechanisms to automatically built process views at different levels of granularity.
- Scientific responsible of the CINI research unit for the project “TETRIS: Servizi innovativi Open Source su TETRA” (PON R&C MIUR, budget of the unit: EUR ~500K, 2011→2013). The project explored the capabilities of the TETRA network to create a complex and articulated Smart Environment, providing advanced services such as emergency management, environmental control, and smart mobility in urban areas.
- Scientific responsible of the UniCal research unit for the project “Business Games nel Settore Turistico” (PIA Calabria, budget of the unit: EUR ~60K, 2010→2012). The project defined a platform for business games tailored for the tourism, by using a simulation model built via declarative logic-based methods.
- Scientific responsible of the UniCal research unit within the “OpenKnowTech” Lab for the goal “Open Source per la gestione di processi e il Business Process Intelligence” (MIUR, budget of the unit: EUR ~97K, 2007→2011), which was meant to define and implement systems for advanced reasoning capabilities to support process design and monitoring.
- Responsible for the design of the INFOMIX prototype system within the project “INFOMIX: boosting information integration” (EU FP5). The project—valuated as a success story by the EU—was meant to design an innovative information integration system, equipped with reasoning capabilities to manage incomplete and inconsistent data based on appropriate semantic conflict resolution. The system has been built on top of the Answer Set Programming engine DLV.
- Member of the research units (often as workpackage leader) in several founded national and international projects, including (since 2003): *Cyber Security District*, *BA2Know - Business Analytics to Know*, *Talent Hunter Technology*, *Information and Mobility for Tourism*, *TOCA.IT*, *ONTODLV*, *WASP*, and *G4B*.



Moreover, he collaborates with a number of companies, startup, universities, research centers, and public bodies on the development of innovative applications involving AI. In particular, since 2018 he has been the *chief scientific advisor* of a large-scale project (EUR ~18M founded by Regione Calabria), whose goal is to innovate the whole infrastructure of UniCal dedicated to support teaching activities (wifi, data centers, sensors for environmental monitoring and automatic attendance recording, room and timetable planners, ICT platforms for e-learning and collaborative teaching, and so on).

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## TECHNOLOGY TRANSFER OF AI SOLUTIONS

He co-founded two spin-offs of UniCal providing services and systems based on AI solutions:

- “Artémat”, offering software and services for recruitment and formation of managerial profiles. Artémat developed and maintains a business game platform, where artificial intelligence techniques are combined with game-theory approaches to simulate strategic behaviors over economic models of markets.
- “IDUM”, offering a platform for e-tourism with advanced reasoning capabilities. The platform is based on an ontological modeling of the domain (via disjunctive logic programs/answer set programming) and exploits mechanisms for intelligent (travel) recommendations defined on top of it.

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## AI SYSTEMS

He contributed to design of a number of AI systems:

- “DLV”, which is a disjunctive logic programming system implementing the stable model semantics under the Answer set programming paradigm. He contributed to DLV by designing the optimization modules implementing the magic set method [JCSS-07a, AIJ-12].
- “INFOMIX”, which is an information integration system, equipped with reasoning capabilities to manage incomplete and inconsistent data. Within the EU FP5 project “INFOMIX: boosting information integration”, he was responsible for the design of INFOMIX, by exploiting some of his results related to the use of logic-programs to resolve conflicts arising from the integration of different knowledge bases [TKDE-03, TODS-05, SIGMOD-05].
- “H-DB”, which is a structural optimizer that exploits the hypertree decomposition method to (compute answers to Boolean queries, or equivalently to) solve CSP instances. He guided the design of the system, which integrated most the techniques he proposed in this context over the years [PODS-04, ICDE-07, JCSS-07b].
- “ProMetheuS”, which is a system designed for applying machine learning techniques to process models. It has been firstly presented at the CAISE forum in 2012. He guided the design of the system, which integrates some algorithms [TKDE-05] that were already made available as plug-ins for the ProM system developed at the Eindhoven University of Technology.
- “LTL2SAT”, which is a state-of-the-art system to reason about Linear Temporal Logic over finite traces. He guided the design of the system on top of his results related to the satisfiability and complexity of this logic [AAAI-16, JAIR-18].
- “LP-OD”, which is system capable of identifying outliers from logical theories. The system has been presented at the LPNMR conference in 2007. He guided its design based on the algorithms proposed in [TOCL-07].
- “L-SME”, which is a system designed to identify motifs from biological data. The system has been presented at the ECML conference in 2011. He guided its design based on the algorithms proposed in [TKDE-08].

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## PUBLISHED PAPERS AND IMPACT

The results of his research in AI are described in several journal papers, including *Artificial Intelligence* (9), *Journal of Artificial Intelligence Research* (4), *Journal of the ACM*, *SIAM Journal on Computing*, *Journal of Computer and System Sciences* (3), *ACM Transactions on Computation Theory*, *ACM Transactions on Database Systems*, *ACM Transactions on Computational Logics*, *ACM Transactions on Knowledge Discovery from Data*, *Theoretical Computer Science* (2), *Theory and Practice of Logic Programming* (2), and *IEEE Transactions on Knowledge and Data Engineering* (5). Moreover, he published more than 120 conference papers, of which 30 ranked A\* (16 IJCAI, 4 AAAI, 4 PODS, 3 AAMAS, 1 EC, 1 SIGMOD, 1 ICDE) and 24 ranked A (including 3 ECAI, 3 LPNM, 3 ICLP, 2 ICALP, 2 JELIA, 2 CP, 1 ECML, 1 TARK, 1 ICDT, 1 MFCS) according to the CORE ranking.<sup>1</sup> An (incomplete) list of his publications is available from DBLP.<sup>2</sup>

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<sup>1</sup><http://portal.core.edu.au/conf-ranks/>

<sup>2</sup><https://dblp.uni-trier.de/pers/hd/g/Greco:Gianluigi>

The numerous prizes and awards he received witness the quality and the impact of his research activities. Moreover, his works received more than 3982 citations, with h-index=35.<sup>3</sup> In particular,

- His work “Characteristic function games with restricted agent interactions: Core-stability and coalition structures”, co-authored with G. Chalkiadakis and E. Markakis, appeared in the list of the *most cited articles* of the *Artificial Intelligence* journal, for the period 2016→2019.<sup>4</sup>
- His work “On the complexity of core, kernel, and bargaining set”, co-authored with E. Malizia, L. Paolopoli, and F. Scarcello, appeared in the list of the *most downloaded articles* of the *Artificial Intelligence* journal, for 5 consecutive months in 2011.<sup>5</sup>

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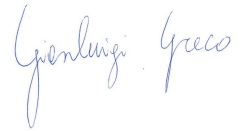
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October 26, 2023

Prof. Gianluigi Greco

A handwritten signature in blue ink that reads "Gianluigi Greco". The signature is written in a cursive style with a large initial 'G'.