Curriculum Vitae

Lefteris M. Kirousis, Professor

Department of Mathematics
National and Kapodistrian University of Athens

General information

Birthdate: July 31, 1951.
Address: Department of Mathematics, National & Kapodistrian University of Athens
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Education

1973: First academic degree; Department of Mathematics, National & Kapodistrian University of Athens.
1974: M.A.; Department of Mathematics, University of California, Los Angeles.
1978: Ph.D.; Department of Mathematics, University of California, Los Angeles advisor: Y.N. Moschovakis.

Research interests (areas with published work)

- Mathematical Logic
- Foundations of Computer Science
- Design and Analysis of Computer Algorithms (serial, parallel, randomized, approximative)
- Computational Social Choice
- Distributed Computing
- Computer Vision

Teaching experience

He has a career in university teaching expanding over four decades. In the US, has taught at the Dept. of Mathematics of the University of California, Los Angeles (as a post-graduate student), and then at the Dept. of Computer Science of the University of California Santa Barbara (as a visiting assistant professor).

He then taught for many years at the Dept. of Computer Engineering and Informatics of the University of Patras and for the last seven years at the Dept. of Mathematics of the National and Kapodistrian University of Athens. Has also taught at the National Technical University of Athens and the University of Crete.

He has taught an extended range of courses in Computer Science and Mathematics, ranging from elementary courses on Discrete Mathematics, Algorithm Design or Basic Algebra to advanced courses on Computational Complexity, Logic, advanced topics on Algorithms and Discrete Probabilistic Methods.

He enjoys teaching very much and invariably gets very good evaluations from students (available only in greek).

Has also taught at inter-university post-graduate programs on Logic, Theory of Algorithms, Computation and Decision making (with participating universities: National Technical University of Athens, National & Kapodistrian University of Athens and University of Patras). His teaching at the above post-graduate programs includes advanced, research-oriented seminars.

Supervision of Ph.D. theses

Completed

- Philippas Tsigas (1994, now Professor, Chalmers University of Technology, Göteborg),
- Dimitrios Thilikos (1994, now Professor, National & Kapodistrian University of Athens, and researcher at CNRS, LIRMM, Montpelier),
- Nick Dendris (1996, now Software Unit Manager, International Technical Department at UniSystems, Greece),
- Yannis Stamatiou (1997, now Professor, University of Patras),
- Elias Stavropoulos (2003, now Scientific Assistant, Hellenic Open University),
- Alexis Kaporis (2003, now Asst. Professor, University of the Aegean).

In progress

- John Livieratos (date started: October 2016).

Funded research or educational programs

- Insight II (ESPRIT Basic Research, 1992–1994), coordinator in Patras.
- ALCOM I and II (ESPRIT Basic Research, 1989–1995), key researcher.
- Galois and Socrates (EU funded exchange programs, 1992–1995), coordinator in Patras.
- DELIS (IST FP6, 2004–2008), key researcher, total budget €6,800,000
- FRONTS (IST FP6, 2008-2011), key researcher, Greek budget €400,000, total budget €3,000,000.
- RIMACO (ERC, 2008–2013), member of the research group in a starting research grant.
- Participated in scientific exchange programs with Germany and Hungary.

Coordinated several national research or educational programs funded by Greek sources (1993–present), among them:

- Scientific coordinator of the funding project of the inter-departmental post-graduate program on Mathematics of Computers and Decision Making (1998–2001).
- AGT (Algorithmic Game Theory) 2012–2015, key researcher, budget €400,000.
- IMRF (Inference in Markov Random Fields) 2014–2015, scientific coordinator, budget €236,000.

Service to the community

Member of the program/scientific committee of the following international conferences and workshops:

- 43rd International Symposium on Mathematical Foundations of Computer Science, MFCS 2018 (Liverpool, UK).
- 11th Panhellenic Logic Cooloquium, PLS 2017 (Delphi, Greece).
- 36th International Conference on Current Trends in Theory and Practice of Computer Science, SOFSEM 2010 (Špindlerův Mlýn, Czech Republic),
- Workshop on Mathematical Aspects of Large Networks, 2009 (Centre de Recerca Matemàtica, Bellaterra, Barcelona) co-organizer with J. Díaz and C. Martínez,
- Conference on Probabilistic Techniques in Computer Science 2009 (Centre de Recerca Matemàtica, Bellaterra, Barcelona), co-organizer with J. Díaz and C. Martínez,
- 11th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, SYNASC 2009 (Timisoara),
- DELIS Workshop on Theoretical Aspects and Models of Large, Complex and Open Information Networks, DELIS-CompNet 2006 (Barcelona) and 2007 (Turin),
- 7th International Symposium on Logical Formalizations of Commonsense Reasoning, COMMONSENSE 2005 (Corfu),
- Fourth Panhellenic Logic Symposium, PLS 2003 (Thessaloniki), chair of the scientific committee, member of the Steering Committee of PLS since 2005,
- 5th, 7th and 8th International Symposia on Theory and Applications of Satisfiability Testing, SAT 2002 (Cincinnati, Ohio), SAT 2004 (Vancouver, BC) and SAT 2005 (St. Andrews, Scotland),
- Workshop on Typical-Case Complexity and Phase Transitions, held in conjunction with the IEEE Symposium on Logic in Computer Science, LICS 2003 (Ottawa), co-organizer with E. Kranakis,
- 2nd and 9th International Colloquia on Structural Information and Communication Complexity: SIROCCO 1995 (Olympia), co-chair with E. Kranakis, and SIROCCO 2002 (Andros), co-chair with Ch. Kaklamanis; member of the steering committee of this conference since 1995,
- Workshop on Randomized Algorithms in Sequential, Parallel, and Distributed Computing, RALCOM 1997 (Santorini),
- 22nd, 23rd and 24th International Workshops on Graph-Theoretic Aspects of Computer Science, WG 1996 (Cadenabbia), WG 1997 (Berlin) and WG 1998 (Bratislava),
- 11th International Workshop on Distributed Algorithms, WDAG 1997 (Delphi),
- 2nd Annual European Symposium on Algorithms, ESA 1994 (Utrecht),
- IEEE International Conference in Computer Vision, ICCV 1999 (Kerkyra),
- 3rd European Conference on Computer Vision, ECCV 1994 (Stockholm).

Guest editor of special issues of *Theory of Computing Systems* (2002) and *Discrete Applied Mathematics* (2005).

Member of the editorial board

- *Bulletin of the Hellenic Mathematical Society* (electronic)
- *Theoretical Computer Science*, Elsevier (print)
- *Journal of Artificial Intelligence Research JAIR* (2001–2004), electronic and print journal, Morgan Kaufmann Publishers and of the
- *Journal on Satisfiability, Boolean Modeling and Computation JSAT* (since 2004), published by Delft University.

Research publications

Listed below are *exclusively* research publications in refereed international journals since year 2000.

As of October 2018, his total number of publications, over all years, is (per various sources): MathSciNet: 55 publications, Google Scholar: 117 publications, Web of Science: 172 publications

J1 L. Kirousis, P. Kolaitis and J. Livieratos. "Aggregation of votes with multiple positions on each issue," In print: *ACM Transactions on Economics and Computation*.

J2 L.Kirousis and G. Kontogeorgiou. "The *problème des ménages* revisited," *The Mathematical Gazette* 102(553) (2018) 147–149, Cambridge University Press. pdf

J3 J. Díaz, I. Giotis, L. Kirousis, I. Mourtos, and M.J. Serna. "The social cost of congestion games by imposing variable delays," *ICT Express*, 3(4) (2018) 155-159.

J4 I. Giotis, L.M.Kirousis, K.I. Psaromiligkos, and D.M. Thilikos: "Acyclic edge coloring through the Lovász Local Lemma," *Theor. Comp. Sci.* 665 (2017) 40–50. pdf

J5 J. Díaz, I. Giotis, L.M. Kirousis, E. Markakis, and M.J. Serna: "On the stability of generalized second price auctions with budgets," *Theory of Computing Systems*, 59(1) (2016) 1–23. pdf

J6 J. Díaz, A.C. Kaporis, L.M. Kirousis, G.D. Kemkes, X. Pérez, and N. Wormald, "On the chromatic number of a random 5-regular graph," *Journal of Graph Theory* 61(3) (2009) 157–191. pdf

J7 J. Díaz, L.M. Kirousis, D. Mitsche, and X. Pérez-Giménez, "On the satisfiability threshold of formulas with three literals per clause," *Theor. Comput. Sci.* 410(30-32) (2009) 2920–2934. pdf

J8 A.C. Kaporis, L.M. Kirousis, Y.C. Stamatiou, M. Vamvakari, and M. Zito, "The unsatisfiability threshold revisited," *Discrete Applied Mathematics* 155(12) (2007) 1525–1538. pdf

J9 G. Georgiadis and L.M. Kirousis, "Lightweight centrality measures in networks under attack," *ComPlexUs: Modelling in Systems Biology, Social, Cognitive and Information Sciences* 3 (2006) 147–157. pdf

J10 A.C. Kaporis, L.M. Kirousis, and Y.C. Stamatiou, "How to prove conditional randomness using the Principle of Deferred Decisions," in: A.G. Percus, G. Istrate and C. Moore, eds., *Computational Complexity and Statistical Physics* (Oxford University Press, New York, 2006) 179–194. ps

J11 L.M. Kirousis, Y.C. Stamatiou, and M. Zito, "The unsatisfiability threshold conjecture: the techniques behind upper bound improvements," in: A.G. Percus, G. Istrate and C. Moore, eds., *Computational Complexity and Statistical Physics* (Oxford University Press, New York, 2006) 159–178. pdf

J12 A.C. Kaporis, L.M. Kirousis, and E.G. Lalas, "The probabilistic analysis of a greedy satisfiability algorithm," *Random Structures and Algorithms* 28(4) (2006) 444–480. pdf

J13 L.M. Kirousis and Ph.G. Kolaitis, "A dichotomy in the complexity of propositional circumscription," *Theory of Computing Systems* 37(6) (2004) 695–715. pdf

J14 L.M. Kirousis and Ph.G. Kolaitis, "The complexity of minimal satisfiability problems," *Information and Computation* 187 (2003) 20–39. pdf

J15 L.M. Kirousis, E. Kranakis, D. Krizanc, and Y.C. Stamatiou, "Locating information with uncertainty in fully interconnected networks: the case of nondistributed memory", *Networks* 42(3) (2003) 169–180. pdf

J16 P. Bose, Ch. Kaklamanis, L.M. Kirousis, E. Kranakis, D. Krizanc, and D. Peleg, "Station layouts in the presence of location constraints," *Journal of Interconnection Networks* 3(1&2) (2002) 1–17. pdf

J17 A.C. Kaporis, L.M. Kirousis, E. Kranakis, D. Krizanc, Y.C. Stamatiou, and E.C. Stavropoulos, "Locating information with uncertainty in fully interconnected networks with applications to world wide web information retrieval," *The Computer Journal* 44(4) (2001) 221–229. pdf

J18 L.M. Kirousis, Y.C. Stamatiou, and M. Vamvakari, "Upper bounds and asymptotics for the q-binomial coefficients," *Studies in Applied Mathematics* 107(1) (2001) 43–62. pdf

J19 D. Achlioptas, L.M. Kirousis, E. Kranakis, and D. Krizanc, "Rigorous results for random $(2+p)$-SAT," *Theoretical Computer Science* 265 (2001) 109–129. pdf

J20 D.Achlioptas, L.M. Kirousis, E. Kranakis, D. Krizanc, M.S.O. Molloy, and Y.C. Stamatiou, "Random constraint satisfaction: a more accurate picture," *Constraints* 6(4) (2001) 329–344. pdf

J21 N.D. Dendris, L.M. Kirousis, Y.C. Stamatiou, and D.M. Thilikos, "On parallel partial solutions and approximation schemes for local consistency in networks of constraints," *Constraints* 5 (2000) 251–273. pdf

J22 L.M. Kirousis, E. Kranakis, D. Krizanc, and A. Pelc, "Power consumption in packet radio networks," *Theoretical Computer Science* 243 (2000) 289–305. pdf

Books

As editor

- J. Díaz, L. Kirousis, L. Ortiz-Gracia, and M. Serna (eds.). *Research Perspectives CRM Barcelona, Extended Abstracts Summer 2015* (Springer, Birkhäuser Mathematics, 2015).
- Ch. Kaklamanis and L. Kirousis (eds.), *Sirocco 9, The 9th International Colloquium on Structural Information and Communication Complexity* (Proceedings in Informatics, Carleton Scientific, 2002).
- L.M. Kirousis and E. Kranakis (eds.), *Proceedings of the 2nd Colloquium on Structural Information and Communication Complexity, SIROCCO 1995* (Carleton University Press, International Informatics Series 2, 1996)
- S. Toueg, P. Spirakis, and L.M. Kirousis (eds.), *Proceedings of the 5th International Workshop on Distributed Algorithms, WDAG 1991* (Springer, L.N. Computer Science, 1992).

Textooks in Greek

- Ε. Κυρούσης, Χ. Μπούρας και Π. Σπυράκης, *Διακριτά Μαθηματικά: Τα Μαθηματικά της Επιστήμης των Υπολογιστών* και Γ. Βουτσαδάκης, Ε. Κυρούσης, Χ. Μπούρας και Π. Σπυράκης, *Διακριτά Μαθηματικά: Προβλήματα και Λύσεις*, 2η ενιαία έκδοση (Gutenberg, Αθήνα, 2008).
- Ε. Κυρούσης, Χ. Μπούρας, Ι. Σταματίου και Π. Σπυράκης, *Εισαγωγή στους Γράφους: Θεωρία, Προβλήματα και Λύσεις* (Εκδόσεις ΕΑ-ΙΤΥ, Αθήνα, 1999).

Citations (October 2018)

MathSciNet: 365 citations by 387 authors.
Google Scholar: 2957 citations, h-Index: 23, most cited publication: 404 citations.
Web of Science: 999.

Recent research activity

His most recent activity is about very simple randomized algorithms for complex problems. He has mainly worked on applications of a powerful combinatorial result, known as the Lovász Local Lemma (LLL), which gives conditions under which undesirable results can be avoided, given that the distribution is such that avoiding one increases the probability of others to occur. Although this result dates back to the seventies, it was only very recently proved that a solution can be efficiently computed, through a linear randomized algorithm. In [J4], LLL is applied on a setting (graph colorability) where events depend on a number of variables; however these variables, unlike most other applications in the area, are not independent of each other.

He has also recently worked (i) on Computational Social Choice [C??, J1], where a new characterization of the the possibility of aggregating multiple-valued opinions on several issues is given; and (ii) Auction Theory from a computational and game theoretic point of view [J3, J5].

Prior to that, his work was mainly on hard Constraint Satisfaction Problems (CSP) like satisfiability (Sat) or coloring (Col). In the probabilistic context, his work in this area

is related to phase transition phenomena of the typical complexity and solvability of such problems, first experimentally observed in the beginning of 90's. Typical in this case refers to results that are true for almost all input instances, as the the input size grows. Experiments had shown that both complexity and solvability undergo abrupt changes for specific values of the density of constraints (relative to the number of variables). These experimental results were verified by theoretical (but not mathematically rigorous) techniques of statistical physics. His work in collaboration with colleagues and students provided mathematical proofs for bounds on the threshold values of the density where phase transition takes place. A series of papers culminated in the best to date upper bound for the solvability/unsolvability threshold of 3-Sat [J8]. The techniques in these papers are of non-algorithmic nature. Jointly with students, he has also found the best to date lower bound of the same threshold [J12] using algorithmic techniques. On the other hand jointly with colleagues, he has proved a lower bound result on the colorability of regular graphs of small degree [J6] with a non-algorithmic, analytic, technique. His work on thresholds is referenced in journals whose scope is outside theoretical computer science or discrete mathematics, like *Nature*, *Physical Review*, *Physica*, *European Physical Journal*, *Physical Review Letters and Europhysics Letters*.

In addition, in the deterministic context, he has published on the dichotomy of complexity of Sat. The classical result here is due to Schaefer (1978) and states that Sat is either NP-complete or polynomially solvable, in other words cases of intermediate complexity are excluded (a characterization of both cases was also known). Kirousis and Kolaitis, supplied such a dichotomy result for a case of satisfiability that expresses circumscription, a method of default reasoning in AI articles [J13, J14].

He has also published extensively in the areas of Parallel and Distributed Computing and Network Design. His work here is also considered fundamental and is much referenced.

Mentoring

Besides his purely research work, L.M. Kirousis has advised several students at all levels. In addition to the names that appear in the list of his "official" Ph.D. students, he has inspired many more students to take up research careers and encouraged them to pursue post-graduate studies in leading European or North American universities. Many are by now successful researchers or professionals. He has kept contact and continues to collaborate with several among them. Also, he has been a member of the advising or examination committees for Ph.D. candidates in France, UK and Catalunya.

One other important aspect of his contribution to the research environment of Greece was the establishment, in collaboration with others, of the inter-university "Graduate Program in Logic, Algorithms and Computation" (MPLA), a most successful graduate program bringing together students, faculty and other resources from the leading departments of mathematics and computer science in Greece.

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