

# 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.

1978: Ph.D.; Department of Mathematics, University of California, Los Angeles  
advisor: Y.N. Moschovakis.

### Research interests (areas with published work)

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

### Teaching experience

Has taught at the Dept. of Mathematics of the University of California, Los Angeles (TA); the National Technical University of Athens (Lecturer); the Dept. of Mathematics of the University of Crete (Lecturer); the Dept. of Computer Science of the University of California at Santa Barbara (Visiting Assistant Professor); the Depts. of Mathematics and of Computer Engineering and Informatics of the University of Patras (Professor since 1992), and the Dept. of Mathematics of the National & Kapodistrian University of Athens (present affiliation, since 2011).

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).

**Courses taught:** Logic, Algorithms, Complexity, Discrete Mathematics, Theory of Computation, Graph Theory, various introductory courses in both Mathematics and Computer Science and advanced research courses.

## **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, Montpellier).
- Nick Dendris (1996, now Senior Manager, Printec, Greece),
- Yannis Stamatiou (1997, now Assoc. 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 (E.U. 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.

## **Member of the program committee of conferences and workshops**

- 3rd European Conference on Computer Vision, ECCV 1994 (Stockholm)
- 2nd Annual European Symposium on Algorithms, ESA 1994 (Utrecht)
- 2nd and 9th International Colloquia on Structural Information and Communication Complexity, SIROCCO 1995 (Olympia), co-chair with E. Kranakis, and 2002 (Andros), co-chair with Ch. Kaklamani and member of the steering committee
- 22nd, 23rd and 24th International Workshops on Graph-Theoretic Aspects of Computer Science, WG 1996 (Cadenabbia), 1997 (Berlin) and 1998 (Bratislava)
- 11th International Workshop on Distributed Algorithms, WDAG 1997 (Delphi)
- Workshop on Randomized Algorithms in Sequential, Parallel, and Distributed Computing, RALCOM 1997 (Santorini)
- IEEE International Conference in Computer Vision, ICCV 1999 (Kerkyra)
- 5th, 7th and 8th International Symposia on the 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-chair with E.Kranakis
- 4th and 11th Panhellenic Logic Colloquia, PLS 2003 (Thessaloniki) chair, and PLS 2017 (Delphi)
- 7th International Symposium on Logical Formalizations of Commonsense Reasoning, COMMONSENSE 2005 (Corfu)
- DELIS Workshop on Theoretical Aspects and Models of Large, Complex and Open Information Networks, DELIS-CompNet 2006 (Barcelona) and 2007 (Turin)
- 11th International Symposium on Symbolic and Numeric Algorithms for Scientific Computing, SYNASC 2009 (Timisoara)
- Conference on Probabilistic Techniques in Computer Science 2009 (Centre de Recerca Matemàtica, Bellaterra, Barcelona), co-organizer with J. Díaz and C. Martínez
- Workshop on Mathematical Aspects of Large Networks, 2009 (Centre de Recerca Matemàtica, Bellaterra, Barcelona) co-organizer with J. Díaz and C. Martínez
- 36th International Conference on Current Trends in Theory and Practice of Computer Science, SOFSEM 2010 (Špindlerův Mlýn, Czech Republic)
- Workshop on Strategic Behaviour and Phase Transitions in Random and Complex Combinatorial Structures, 2015 (Centre de Recerca Matemàtica, Bellaterra, Barcelona) co-organizer with D. Achlioptas, J. Díaz and M. Serna

## Member of the editorial board of journals

- *Bulletin of the Hellenic Mathematical Society* (electronic)
- *Theoretical Computer Science* (print, Elsevier)
- *Journal on Satisfiability, Boolean Modeling and Computation JSAT* (electronic and print)
- *Journal of Artificial Intelligence Research JAIR* (electronic and print) 2004–2011

## Publications

Selected recent articles (for an almost complete list: <http://users.uoa.gr/~lkirousis>)

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.

7. L.M. Kirousis and Ph.G. Kolaitis, “A dichotomy in the complexity of propositional circumscription,” *Theory of Computing Systems* 37(6) (2004) 695–715.
8. L.M. Kirousis and Ph.G. Kolaitis, “The complexity of minimal satisfiability problems,” *Information and Computation* 187 (2003) 20–39.
9. L.M. Kirousis, E. Kranakis, D. Krizanc, and A. Pelc, “Power consumption in packet radio networks,” *Theoretical Computer Science* 243 (2000) 289–305.

### Publication metrics

- MathSciNet: 48 publications, 337 citations.
- Google Scholar: 113 publications, 2850 citations (most often cited publication: 397 citations), h-index: 24.

### Invitations and extended visits

He has spent a considerable part of his career visiting for an extensive period other universities and research institutes, like Centrum voor Wiskunde en Informatica, Carleton University, University of California, Santa Cruz, and Universitat Politècnica de Catalunya. He was also invited to several places for shorter periods, for example, Microsoft Research, Redmond (twice), Schloss Dagstuhl (six times), Leibniz-Zentrum für Informatik, Mathematisches Forschungsinstitut Oberwolfach, Institute for Pure and Applied Mathematics, Los Angeles, Centre de Recerca Matemàtica, Bellaterra and several conferences and workshops.

### 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 [1] (see selected articles), 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 on Auction Theory from a computational and game theoretic point of view (selected articles [2]).

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 [5]. 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 (see selected articles [6]) 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 (selected articles 3]) 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 (see Selected articles [8], [7]).

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.

## References

- Professor Josep Díaz, Dept. of Computer Science, Universitat Politècnica de Catalunya  
Webpage: <https://www.cs.upc.edu/~diaz/>, Email: [diaz@cs.upc.edu](mailto:diaz@cs.upc.edu).
- Professor Phokion Kolaitis, Computer Science Dept.  
<https://users.soe.ucsc.edu/~kolaitis/>, Email: [kolaitis@cs.ucsc.edu](mailto:kolaitis@cs.ucsc.edu).
- Professor Paul Spirakis, Department of Computer Science, University of Liverpool  
Webpage: <https://www.liverpool.ac.uk/computer-science/staff/paul-spirakis/>,  
Email: [P.Spirakis@liverpool.ac.uk](mailto:P.Spirakis@liverpool.ac.uk).

### With respect to mentoring:

- Xavier Pérez Giménez, Assist. Professor, Dept. of Mathematics, U. Nebraska-Lincoln,  
Webpage: <http://www.math.unl.edu/~xperezgimenez2/>, Email: [xperez@unl.edu](mailto:xperez@unl.edu).

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