

CURRICULUM VITAE

NAME: László A. Székely

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HOME PAGE: <http://www.math.sc.edu/~szekely/> (includes list of publications, current preprints, and lists 1100 citations)

LANGUAGES: I speak English and Hungarian, read German and Russian.

DEGREES:

- Master of Sci., Eötvös University, 1980
- Ph. D., Eötvös University, 1983; Thesis: "Geometric Graphs", supervisors: Vera T. Sós and M. Simonovits.
- Candidate for Math. Sci., Hungarian Academy of Sciences, 1987, Thesis: "Analytic Methods in Combinatorics", referees: Zoltán Füredi and Paul Erdős.

POSITIONS:

- 1982–84: research fellow at József Attila University, Szeged
- 1984–91 associate professor at Eötvös University, Budapest
- 1986–87: postdoctoral fellow at the University of Auckland, New Zealand
- 1988–90: visiting associate professor at University of New Mexico, Albuquerque, NM
- Summer 1990: held a visiting position at Memphis State University, Memphis, TN
- 1991–1996 senior associate professor at Eötvös University, Budapest
- 1991–92: Alexander von Humboldt Fellow at the Rheinische Friedrich-Wilhelms Universität, Institut für Ökonometrie und Operations Research, and Institut für diskrete Mathematik, Bonn, Germany
- 1992–93: visiting associate professor at University of New Mexico, Albuquerque, NM
- 1994–96 Director of the Institute of Mathematics I at Eötvös University, Budapest
- 1996– professor at the University of South Carolina, Columbia
- 2002–03 Visiting Fellow at the National Center for Biotechnology Information, supported by the Oak Ridge Institute for Science and Education (while on sabbatical leave)
- 2005– Interim Director of the Industrial Mathematics Institute of the University of South Carolina

INVITATIONS TO CONFERENCES:

- Conference of the Australasian Combinatorial Society, Dunedin, New Zealand, December 1986 "Inclusion-exclusion formulae without higher terms" (50 mins)
- AMS Meeting at Manhattan, Kansas, Graph Theory Session, March 1990 "Integral concurrent flows" (20 mins)
- Twente/Osnabrück Seminar, Enschede, The Netherlands, February 1992 "Applications of classical inequalities in graph theory" (50 mins)
- 7th Midwest Conference on Combinatorics, Cryptography and Computing, Carbondale, Illinois, October 1992 "Reconstruction of evolutionary trees" (50 mins)
- AMS Meeting at deKalb, Illinois, Extremal Combinatorics Session, May 1993 "Crossing number problems" (20 mins)
- Extremal Combinatorics Workshop, MSRI, Berkeley, November 1996 "Crossing numbers and Szemerédi-Trotter theorems" (30 mins)

- DIMACS Workshop on Probabilistic Analysis of Algorithms, Princeton University, May 1997 “The Short Quartet Method” (30 mins)
- AMS Meeting at Oaxaca, Mexico, Graph Theory and Combinatorial Geometry Session, December 1997 “On bipartite crossings, largest biplanar subgraphs, and the linear arrangement problem” (20 mins)
- Buneman and Beyond, Massey University, Palmerston North, New Zealand, May 1998 “The Short Quartet Method” (30 mins)
- Frontiers of Combinatorics, Los Alamos National Laboratory, August 1998 “The Short Quartet Method” (two times 50 mins)
- AMS Meeting at Winston-Salem, North Carolina, Combinatorics and Graph Theory Session, October 1998 “Inverting random functions” (20 mins)
- Numbers, Information and Complexity — in honour of Professor Rudolf Ahlswede on his 60th birthday, Bielefeld, Germany (30 mins) (I could not go but contributed to the volume)
- Meeting of the Canadian Mathematical Society, December 1998, Kingston, Ontario “New Erdős-Ko-Rado type problems” (20 mins)
- 12th Cumberland Conference, May 1999 Louisville, Kentucky “Katona type proof for the 2-intersecting Erdos-Ko-Rado theorem” (20 mins)
- The Mathematics of Paul Erdős, July 1999, Budapest, Hungary “Erdős on unit distances” (30 mins)
- 14th Clemson Mini-Conference, September 1999, Clemson, South Carolina, “Erdős on unit distances and the Szemerédi-Trotter theorems” (50 mins)
- AMS Meeting at Charlotte, NC, October 1999, Applied Probabilistic Combinatorics Session, “Phylogeny needs more probability for sure” (20 mins)
- Third UNCG Mini-conference in Combinatorics and Graph Theory, November 1999, Greensboro, NC, “Are there infinitely many Leech trees?” (20 mins)
- Tenth SIAM Conference on Discrete Mathematics, Minisymposium on Combinatorial Geometry, June 2000, Minneapolis MN, “Crossing numbers of graphs” (30 mins)
- Sixth International Conference on Graph Theory, Marseille, August 2000 “A successful concept for measuring non-planarity of graphs: the crossing number” (60 mins)
- Fourth UNCG Mini-conference in Combinatorics and Graph Theory, November 2000, Greensboro, NC, “Sets in Euclidean spaces without certain distances” (50 mins)
- Workshop and Conference on Hypergraphs (Gyula O.H. Katona is 60) June 4-17, 2001 Rényi Institute, Budapest, Hungary, “Katona type proof for the 2-intersecting Erdos-Ko-Rado theorem” (30 mins)
- DMV-Seminar “Mathematical Challenges of Molecular Biology” (45 mins), Mathematisches Forschungsinstitut Oberwolfach, Germany, November 11–17 2001 “Methods for Phylogeny Reconstruction” (45 mins),
- Kolloquium über Kombinatorik, November 16–17 2001, Technische Universität Braunschweig, Germany, “Crossing numbers and biplanar crossing numbers” (55 mins)
- 15th Cumberland Conference on Combinatorics, Graph Theory, and Computing, University of Mississippi, May 16–18, 2002, “Biplanar crossing numbers” (15 mins)
- PARC Mini-Symposium, Parallel Algorithms and Architecture Research Centre,

- Loughborough University, England, June 18, 2002, “Biplanar Crossing Numbers” (60 mins)
- DIMACS Special Focus: Computational Geometry and Applications, workshop on Geometric Graph Theory at Rutgers University, New Brunswick, September 30–October 4, 2002 “Crossing numbers and biplanar crossing numbers” (45 mins)
 - AMS Meeting at Bloomington, Indiana, April 4-6, 2003, Probability Session, “Crossing numbers and probability” (45 mins)
 - Paths, Permutations and Trees, February 25 - 27, 2004, Tianjin, P. R. China, “Subtrees of trees” (30 mins)
 - PARADAY V, Fifth PARC Theory Day, Loughborough University, “Subtrees of trees” (30 mins), May 2004, Loughborough, England
 - Special Session on Extremal Combinatorics at the AMS Central Section Meeting (#1001) at Evanston, IL on October 23-24, 2004 “Convex crossing numbers, circular arrangement problem, and isoperimetric functions” (25 mins)
 - SOFSEM 2005, Liptovsky Jan, Slovakia
“Progress on Crossing Number Problems” (90 mins), January 2005
 - Southeast Geometry Conference, Columbia SC, March 2005, “Crossing Numbers”, (50 min)
 - Bioinformatics Mini-Symposium, Columbia SC, March 19 2005, “Paradoxes for Cavender-Farris model trees”, (20 min)
 - Discrete Geometry, Oberwolfach, Germany, April 10–16, 2005, “Variants of the Crossing Number Problem”, (20 min)
 - Joel Spencer is 60 / DIMACS Challenges for Combinatorics
April 24–29, DIMACS, Rutgers University, “Biplanar crossing numbers” (20 min)
 - SIAM Discrete Mathematics Conference, Vancouver, June 25–28, 2006, Geometric Graph Theory minisymposium “TBA” (could not travel)
 - BIRS Workshop, Banff, Canada, October 21–25, 2006 “Bounds on the minor crossing number” (20 min)
 - CanaDAM, Minisymposium on Combinatorial Geometry and Graph Drawing, May 28–31, 2007, Banff Conference Center, Alberta, Canada (25 min) (could not travel)
 - “Extremal Combinatorics” Budapest, June 4-8, 2007 “Lovász Local Lemma for random functions” (45 min)
 - Sixth Slovenian International Conference on Graph Theory, June 23–30 2007, Bled, Slovenia, Minisymposium on Crossing Numbers of Graphs,
“An optimality criterion for crossing numbers” (25 min)
 - Special Session in Graph Theory at the AMS Central Section Meeting at DePaul University, Chicago, October 5-6, 2007 “On the minor crossing number” (25 min)

VISITS AND SEMINARS AT UNIVERSITIES:

(seminars given at my affiliation and in my home town not listed)

- University of New South Wales, Sydney (1986);
- LaTrobe University, Melbourne (1986);
- University of Western Australia, Perth (1986);
- University of Queensland, Brisbane (1986);
- University of Newcastle, Newcastle (1986);

- Otago University, Dunedin (1986);
- University of Colorado at Denver (1988);
- Queen's University, Kingston (1990, 1997);
- University of North Texas, Denton (1990);
- University of Waterloo, Waterloo (1990);
- Università degli Studi di Napoli Federico II, Naples (1991);
- Zentrum für interdisziplinäre Forschung, Bielefeld (one week) (1991);
- Arizona State University, Tempe (1993);
- DIMACS, Rutgers University, Special Year of Mathematical Support to Molecular Biology, Piscataway (one month) (1995);
- Yale University, New Haven (1995, 1999);
- University of Pennsylvania, Philadelphia (1997);
- József Attila University, Szeged (1997);
- University of Canterbury, Biomathematics Research Centre, Christchurch, New Zealand (one month in 1998) (two weeks in 2000) (three weeks in 2004);
- University of Memphis (1999);
- Stefan Banach International Mathematical Center, Warsaw (two weeks) (1999);
- University of North Carolina, Pembroke, NC (2000);
- University of Louisville, Louisville, KY (2000);
- University of Loughborough, Loughborough, England (three weeks in 2001)(two weeks in 2002)(1 month in 2004) (1 month in 2005)(1 month in 2006);
- State University of West Georgia, GA (2003);
- Virginia Tech, VA (2003);
- University of Illinois at Urbana-Champaign, IL (2003)
- Rényi Institute, Budapest, Hungary (2003) (3 talks)
- Allan Wilson Centre for Molecular Ecology and Evolution, Massey University, New Zealand (2004)
- The College of William & Mary, VA (2004)
- University of California, Berkeley, Department of Statistics, Neyman Seminar (2005)
- Illinois Institute of Technology (2006)
- Georgia Tech (2006)
- University of Delaware (2006)
- University of Florida (2006) (two talks)
- University of Alberta (2006)
- Rényi Institute, Budapest, Hungary (2007) (2 months)
- Cambridge University, Newton Institute (2007) (1 month)
- Oxford University (2007)

RESEARCH INTEREST:

My primary research areas are combinatorics and graph theory, and their applications to geometry, computer science and biology. In particular:

- combinatorial geometry: Erdős type problems in geometry, density of sets without certain distances, maximum number of unit distances or minimum number of distinct distances in finite point sets, Szemerédi-Trotter type theorems

- graph drawing: crossing numbers of graphs, applications of crossing numbers of graphs to discrete geometry, graph drawing algorithms on surfaces, books, etc., approximation algorithms for crossing number problems
- phylogeny reconstruction: stochastic models of the evolution of biomolecular sequences, identifiability conditions for reconstructible past, polynomial time algorithms for phylogeny reconstruction, the length of biomolecular sequences necessary for phylogeny reconstruction for all methods and for particular methods, Fourier-Hadamard transform
- discrete probability: stochastic models for biomolecular sequence evolution, derandomization of randomized algorithms for graph drawing
- design and analysis of algorithms: algorithms for graph drawing, approximation algorithms for crossing number problems, algorithms for phylogeny reconstruction
- combinatorial optimization: the multiway cut problem, integral uniform multicommodity flow problem
- extremal problems (graphs and set systems): Erdős-Ko-Rado type theorems, Sperner and LYM type theorems, extremal graph theory

TEACHING:

- courses taught: combinatorics, number theory, calculus and advanced calculus, vector analysis, algorithms, and abstract algebra at undergraduate levels, and several courses of combinatorics, combinatorial optimization and theoretical computer science at graduate level
- Supervising Ph. D. students:
 - Hua Wang, USC 2005, “Subtrees of trees, Wiener index, and related problems” (currently Wang is a John G. Thompson Research Assistant Professor at the University of Florida) (Hua Wang received the “Dean’s Award of Excellence” and the “Dissertation Award of the Graduate School in Science, Mathematics, and Engineering”)
 - current Ph.D. student: Yiting Yang
- substantial joint research, resulting in papers, with five Ph. D. students (although I did not supervise them):
 - Y. Zhang (Ph. D. in CSE, 2005, USC), (currently Zhang is an assistant professor at a College)
 - E. Czabarka (Ph. D. in Math., 1998, USC), (currently Czabarka is an assistant professor at the College of William & Mary)
 - A. Kooshesh (Ph. D. in Comp. Sci., 1992, University of New Mexico), (currently Kooshesh is a faculty at the Sonoma State University)
 - J. McCanna (Ph. D. in Math., 1990, University of New Mexico), (was a faculty at the University of Western Michigan, Kalamazoo)
 - T. Porter (Ph. D. in Math., 1990, University of New Mexico), (currently Porter is a faculty at Southern Illinois University, Carbondale)
- Supervising Master’s Degree students:
 - Kirk McMullan, USC 2006, (left school without degree)
 - Devin James Henson, USC 2006, “Optimization Problems from Genome Sequence Rearrangement”

- Henry Chen, USC 2001, (left school without degree)
- Jason Burns, USC 2000, “Graph subdivision problems” (currently Burns is a Ph. D. student at M.I.T.)
- Szilárd Bokros, USC 1999, “Implementing the Short Quartet Methods”
- Li Chong, USC 1998, “Minimum spanning trees and more: algorithms and analysis”
- Csaba Szász, Eötvös University, 1996, “Tournaments”
- Gábor Heteyi, Eötvös University, 1988, “Catalan numbers” (currently Heteyi is a faculty member at the University of North Carolina at Charlotte)
- József Solymosi, Eötvös University, 1988, “Combinatorial Problems in Finite Ramsey theory” (currently Solymosi is an assistant professor at the University of British Columbia)
- Bernd Radtke, József Attila University, 1985, “Flow and circulation problems: effective algorithms and combinatorial consequences”
- Lenke Körmöczi, József Attila University, 1984, “Expander graphs in the theory of algorithms”
- Zoltán Blázsik, József Attila University, 1984, “Interconnection of probability theory and combinatorics” (currently Blázsik is a faculty at Szeged University, Szeged)
- wrote the lecture notes “Combinatorial Exercises” at József Attila University (1982)
- ran study group for highschool students specializing in advanced mathematics (1975-76, 1984-86)
- course development “Theoretical Computer Science” at Eötvös University (1984-86)
- taught a course at the “Budapest Semester in Mathematics” for mathematically inclined North-American undergraduates (1988)
- taught a short course on graph theory in Naples and wrote lecture notes (1991)
- prepared problems the USC Highschool Mathematics Contest and participated in running the Contest (1996–2000)
- talks to undergraduates about research:
 - SCSU, 1997, “The Mathematics of Paul Erdős”
 - SCSU, 1998, “Phylogeny reconstruction”
 - USC PME, 1999, “Phylogeny reconstruction”
 - SCSU, 2002, “Hilbert’s problems from 1900”
 - USC SIAM Student Chapter, 2005, “Complexities of phylogeny reconstruction”
 - Georgia Tech ACO (Algorithm and Combinatorial Optimization) Pizza Seminar, February 2006, “Mathematical problems of phylogeny”
- Programs written by students
 - S. Bokros implemented under my supervision my “Short Quartet Method” in a program package, <http://www.math.sc.edu/~szekely/szilard/Laciproject/shortq.html>
 - Yong Zhang implemented under my supervision a program to find Leech trees <http://www.math.sc.edu/~szekely/leechtree/index.htm>

AWARDS, HONOURS, SCHOLARSHIPS:

- “People’s Republic Scholar”, twice, for the academic years 1978–79 and 1979–80 (the most prestigious scholarship of the time in Hungary, given to one percent of the university student population).
- “Outstanding Student of the Faculty of Sciences”, 1980, by Faculty of Sciences of Eötvös

University.

- Alexander von Humboldt Fellow, 1991–92, at the Rheinische Friedrich-Wilhelms Universität, Bonn, Germany.
- Exterior member, Alfréd Rényi Mathematical Institute of Mathematics, Hungarian Academy of Sciences, from 1996.
- “Doctor of the Hungarian Academy of Sciences”, 1998.
- Visiting Fellow at the National Center of Biotechnology Information (NCBI/NLM/NIH) supported by the Oak Ridge Institute for Science and Education, 2002–2003 (ten months)
- External Advisory Board Member of a \$ 2.5 million NSF “Research Infused STEM Curriculum” grant at the South Carolina State University 2005–2010
- Russell Research Award for Science, Mathematics and Engineering, 2007

RESEARCH GRANTS:

- Efficient communication in networks, (1992-93)
by the U.S. Office of Naval Research under the contract N-0014-91-J-1385
co-PI, PD: Roger C. Entringer
total amount: \$ 75,000
- New problems in the theory of finite set systems, (1995-98)
by the Hungarian National Science Fund under the contract T 016 358
PD, co-PI: Péter L. Erdős
total amount: HUF 1,480,000
- Extremal combinatorics, (1997-2000)
by NSF under the contract DMS 9701211
co-PD, co-PD: Jerry Griggs
total amount: \$ 135,000
- On the analysis and interpretation of biological sequence data, (2000),
by the South Carolina Commission on Higher Education,
co-PI, PD: A. Hughes.
total amount applied for: \$ 170,000 (approved with reduced budget),
- Combinatorics and its applications, (2000-2003)
by NSF under the contract DMS 0072187
co-PD, co-PD: Jerry Griggs
total amount: \$ 165,000.
- Computational improvements in statistical genomics through the use of novel hardware and parallelized software (2002)
by USC (Focal Points of Excellence)
co-PD, co-PDs: Peter Waddell and Duncan Buell
total amount: \$ 58,108
- Visiting Fellow at the National Center of Biotechnology Information (NCBI/NLM/NIH) (2002-03, ten months)
by the Oak Ridge Institute for Science and Education
total amount: \$ 34,000
- Combinatorics with Applications (2003–2006)
by NSF under contract number 0302307,

co-PD, co-PD: J. Griggs

total amount: \$ 210,000

- Phylogenetic Analysis with Complex Genome Rearrangement Events (2006–2009)
by NIH NIGMS under contract number 1 R01 GM078991-01
co-PI, co-PI: Jijun Tang and Todd Vision
total amount: \$ 639,000
- Extremal and Probabilistic Combinatorics (2007–2010)
by NSF under contract DMS 070 1111
PI, co-PI: Lincoln Lu
total amount: \$ 104,118

EDITORSHIP:

- Editor of the international journal *Combinatorica* since 1987, managing editor till 1995
- Editor of the international journal *SIAM Journal on Discrete Mathematics* since 2003
- one of the guest editors of the special issue 35A of *Ars Combinatoria*
- one of the editors of the volume *Graph Theory and Combinatorial Biology*, Bolyai Society Mathematical Studies **7**, Budapest, 1999.
- one of the guest editors of the special issue vol. 28, no 4, Dec 2002 of *Discrete and Computational Geometry* based on selected papers presented at the special session “Discrete and Computational Geometry and Graph Drawing” at the # 963 Sectional Meeting of the American Mathematical Society

ORGANIZING CONFERENCES:

- organized a session on “Mathematical Methods in Molecular Biology” at the International Conference on Combinatorics and Graph Theory held at Balatonlelle, 1996
- organized the poster session of the conference “Paul Erdős and His Mathematics” held at Budapest, 1999
- co-organized a special session on “Discrete and Computational Geometry and Graph Drawing” at the # 963 Sectional Meeting of the American Mathematical Society, Columbia SC, March 2001.
- member of the organizing committee of the NSF/CBMS Regional Research Conference in Mathematical Sciences on Geometric Graph Theory, May 28 - June 1, 2002, University of North Texas, Denton TX
- co-organizer of an invited double minisymposium at the SIAM Conference on Discrete Mathematics Nashville, June 2004
- member of the program committee of the 12th International Symposium on Graph Drawing, New York City, September 29–October 2, 2004
- member of the organizing committee of the SIAM Conference on Discrete Mathematics, June 25-28, 2006, Vancouver, BC, Canada
- co-organizer of the “Ondrej Sykora Memorial Theory Day” at Loughborough University, England, June 2006
- co-organizes a Special Session on “Algebraic and Extremal Combinatorics” at the AMS Southeastern Sectional Meeting, March 2007, Davidson College, NC
- member of the organizing committee of the “Mini-Conference on Applied Combinatorics with emphasis on Search Theory” at Columbia SC, October 2007

MEMBERSHIP:

- American Mathematical Society
- Fellow of the Institute of Combinatorics and its Applications
- Society for Industrial and Applied Mathematics

SERVICES TO SCIENCE:

- wrote 20 book reviews
- reviewed about 300 papers for Zentralblatt
- reviewed grant proposals for NSF, NSA, NSERC (Canada), Hungarian NSF, Israeli NSF
- referees more than 10 papers per year in recent years
- advisor to the Political Secretary of Culture and Education in Hungary on issues of higher education, and legislation in this area (1996)
- in many semesters run the Combinatorics Seminar at USC
- actively participates in interdisciplinary seminars at USC
- attracted a number of visitors to USC

MAJOR SERVICES TO INSTITUTION:

- director of the Institute of Mathematics I at Eötvös University 1994–96
- member of Dean’s Council at Eötvös University 1994–96
- undergraduate advisor at USC 1996–2002, 2004-05
- member of the Undergraduate Advisory Committee at USC 1997–2001
- member of the Post-Tenure Review Committee at USC 2003–04
- member of the Peer Review of Teaching Committee at USC in several years
- member of the Highschool Mathematics Contest Committee at USC 1996–2000
- colloquium chair at USC 1997–98
- Faculty Senator at USC 2001–02
- 2005– Interim Director of the Industrial Mathematics Institute of the University of South Carolina
- member of the Faculty of Excellence Initiative hiring committees on bioinformatics and on computational nanoscience (2006–08)

July 20, 2007.