

## CURRICULUM VITAE

David B. Shmoys

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### Education

Ph.D., Computer Science, University of California, Berkeley, June 1984.

Thesis: *Approximation Algorithms for Problems in Scheduling, Sequencing & Network Design*

Thesis Committee: Eugene L. Lawler (chair), Dorit S. Hochbaum, Richard M. Karp.

B.S.E., Electrical Engineering and Computer Science, Princeton University, June 1981.

Graduation with Highest Honors, Phi Beta Kappa, Tau Beta Pi.

Thesis: *Perfect Graphs & the Strong Perfect Graph Conjecture*

Research Advisors: H. W. Kuhn, K. Steiglitz and D. B. West

### Professional Employment

Director, School of Operations Research & Information Engineering, Cornell University, 2013–present.

Laibe/Acheson Professor of Business Management & Leadership Studies, Cornell, 2013–present.

Professor of Operations Research & Information Engineering and of Computer Science, Cornell, 2007–present.

Visiting Professor, Sloan School of Management, MIT, 2010–2011.

Visiting Research Scientist, New England Research & Development Center, Microsoft, 2010–2011.

Professor of Operations Research & Industrial Engineering and of Computer Science, Cornell University, 1997–2006.

Visiting Research Scientist, Computer Science Division, EECS, University of California, Berkeley, 1999–2000.

Associate Professor of Operations Research & Industrial Engineering and of Computer Science, Cornell University, 1996–1997.

Associate Professor of Operations Research & Industrial Engineering, Cornell University, 1992–1996.

Visiting Research Scientist, Department of Computer Science, Eötvös University, Fall 1993.

Visiting Research Scientist, Department of Computer Science, Princeton University, Spring 1993.

Assistant Professor of Operations Research and Industrial Engineering, Cornell University, 1989–1992.

Associate Professor of Applied Mathematics, Massachusetts Institute of Technology, 1989–1990.

Assistant Professor of Applied Mathematics, Massachusetts Institute of Technology, 1985–1989.

Summer Visitor, IBM Almaden Research Center, Summer 1986.

Postdoctoral Fellow, Mathematical Sciences Research Institute, Berkeley, 1986.

Postdoctoral Fellow, Harvard University, 1984–1985.

Mathematician, Operations Research Division, National Bureau of Standards, Gaithersburg, MD, Summer 1980.

### **Awards**

INFORMS Frederick W. Lanchester Prize, 2013.

INFORMS Fellow, 2013.

SIAM Fellow, 2012.

Sonny Yau Award for Excellence in Teaching, Cornell College of Engineering, 2012.

Sonny Yau Award for Excellence in Teaching, Cornell College of Engineering, 2003.

ACM Fellow, 2002.

Sonny Yau Award for Excellence in Teaching, Cornell College of Engineering, 1998.

Sonny Yau Award for Excellence in Teaching, Cornell College of Engineering, 1995.

Cornell AIIE Teaching Award, 1991.

National Science Foundation Presidential Young Investigator Award, 1987–1994.

MIT Graduate Student Council Teaching Award, Department of Mathematics, 1988.

National Science Foundation Graduate Fellow, 1981–1984.

Eugene C. and Mona Fay Gee Scholarship; University of California, Berkeley, 1981-1982.

Phi Beta Kappa Prize, Princeton University, 1981.

James Hayes-Edgar Palmer Prize, School of Engineering, Princeton University, 1981.

Charles Ira Young Memorial Tablet and Medal, EECS Dept., Princeton University, 1981.

## Editorial Positions

Editor-in-Chief, *Research in the Mathematical Sciences*, 2015–present,  
Editorial Board Member, 2014–present.

Editor-in-Chief, *SIAM Journal on Discrete Mathematics*, 1997–2002,  
Editorial Board Member, 1987–2008.

Associate Editor, *Mathematics of Operations Research*, 1992–2003, 2009–present.

Editorial Board Member, Springer Series in Operations Research and Financial Engineering, 2010–present.

Advisory Board Member, *Surveys in Operations Research and Management Science*, 2009–present.

Associate Editor, *Mathematical Programming A*, 1997–2007.

Editorial Board Member, *SIAM Journal on Computing*, 1993–2005.

Co-Editor for Discrete Optimization, *SIAM/MPS Series on Optimization*, 1999–2002.

Associate Editor, *Journal of Scheduling*, 1998–2003.

Editorial Board Member, *Communications of the ACM*, 1987–1991.

Associate Editor, *ORSA Journal on Computing*, 1987–1997.

Associate Editor, *Operations Research*, 1987–1996.

Editorial Board Member, *Discrete Applied Mathematics*, 1987–1992.

Editor, Special Issue of *Mathematical Programming* on Applications of Computer Science Techniques to Combinatorial Optimization (in memory of Eugene L. Lawler)

Editor, Special Issue of *Journal of Algorithms* devoted to select papers from the 11th Annual ACM-SIAM Symposium on Discrete Algorithms, 2000.

## Program Committees

ACM Symposium on the Theory of Computing (STOC), Program Committee Chair, 2014.

29th Conference on Artificial Intelligence (AAAI), Program Committee Member, 2015.

Mathematical Optimization Society Conference on Integer Programming and Combinatorial Optimization (IPCO), Program Committee Member, 2013.

10th International Conference on Integration of Artificial Intelligence (AI) and Operations Research (OR) techniques in Constraint Programming (CPAIOR), Program Committee Member, 2013.

26th Conference on Artificial Intelligence (AAAI), Program Committee Member, 2012.

3rd International Green Computing Conference (GPCC), Program Committee Member, 2012.

ACM-SIAM Symposium on Discrete Algorithms (SODA), Program Committee Member, 2011.  
25th Conference on Artificial Intelligence (AAAI), Program Committee Member, 2011.  
CompSust09, Co-Chair, Program Committee, Co-Chair, June 2009.  
ACM Symposium on Theory of Computing (STOC), Program Committee Member, 2008.  
IEEE Conference on Foundations of Computer Science (FOCS), Program Committee Member, 2002.  
ACM-SIAM Symposium on Discrete Algorithms (SODA), Program Committee Chair, 2000.  
IEEE Conference on Foundations of Computer Science (FOCS), Program Committee Member, 1999.  
Mathematical Programming Society Conference on Integer Programming and Combinatorial Optimization (IPCO), Program Committee Member, 1999.  
ACM-SIAM Symposium on Discrete Algorithms (SODA), Program Committee Member, 1998.  
Mathematical Programming Society Conference on Integer Programming and Combinatorial Optimization (IPCO), Program Committee Member, 1998.  
International Workshop on Approximation Algorithms (APPROX), Program Committee Member, 1998.  
ACM Symposium on Theory of Computing (STOC), Program Committee Member, 1991.

### **Professional Service Positions**

Institute for Mathematics and its Applications, Board of Governors, 2015–present.  
SIAM Activity Group on Mathematics of the Planet Earth, Advisory Board member, 2015–present.  
INFORMS, Lanchester Prize Selection Committee, Chair, 2015.  
INFORMS, Von Neumann Theory Prize Selection Committee, 2015.  
Mathematical Optimization Society, Cluster Co-Chair, Approximation and On-line Algorithms, ISMP, 2015.  
IEEE Technical Committee on Mathematical Foundations of Computing, Chair, 2012–2014,  
Vice-Chair, 2008–2011.  
INFORMS, Lanchester Prize Selection Committee, 2014.  
INFORMS, Von Neumann Theory Prize Selection Committee, 2014.  
SIGACT Committee for the Advancement of Theoretical Computer Science, 2011–present.  
Mathematics of the Planet Earth (2013), Scientific Advisory Committee, 2010–present.  
ICERM, Semester on Network Science and Graph Algorithms, Organizing Committee, Spring 2014.  
INFORMS, Optimization Society, Farkas Prize Selection Committee, Chair, 2012.

INFORMS, Lanchester Prize Selection Committee, 2011, 2012.

INFORMS, Optimization Society, Farkas Prize Selection Committee, 2011.

INFORMS, Nicholson Prize Selection Committee, 2008, 2009.

Mathematical Programming Society, IPCO Steering Committee, Chair, 2002–2004.

Mathematical Programming Society, Council Member-at-large, 1997–2000.

Mathematical Programming Society, Council Member for Publications, 2005–2009.

ACM, E.L. Lawler Prize Selection Committee, 2000–2010, 2012–present.

SIGACT, Council Member Coordinator for Prizes, 2004–present.

Nature Source Genetics, Scientific Advisory Committee, 2006–present.

Eugene L. Lawler Graduate School of Computing, Waterford Institute of Technology, Scientific Advisory Committee, 2007–2010.

FOCS/STOC Site Coordinator, Executive Committee Member, SIGACT, 1989–1991.

Co-Organizer, Workshop on Computational Sustainability at 44th ACM Symposium on Theory of Computing, May 2012.

Co-Organizer, Simons Symposia on Approximation Algorithms for NP-hard problems, January 2013–2017.

Co-Organizer, Oberwolfach Workshop on Combinatorial Optimization, November, 2005.

Co-Organizer, Fields Institute Workshop on Approximation Algorithms, September, 1999.

Co-Organizer, Schloss Dagstuhl Workshop on Approximation Algorithms, August, 1997.

### **Cornell University Service Positions**

Cornell NYC Tech, Jacobs Institute, Recruiting Oversight Committee, 2013–present.

Cornell NYC Tech, Academic Planning Committee, Co-Chair, 2012–2014.

Institute for Computational Sustainability, Associate Director, 2008–present.

College of Engineering, Strategic Planning Advisory Council member (co-chair of committee on Complex Systems, Network Science, & Computation), 2010-2011.

CornellNYC Tech, Proposal Planning Committee for Smart Technologies for the Built Environment Hub, Chair, 2011.

School of Operations Research & Information Engineering, Faculty Recruiting Committee, 2011–2013.

Information Science, Systems, & Technology, Co-Director of Undergraduate Studies, 2011–2013.

School of Operations Research & Information Engineering, Executive Committee, 2008–2010, 2011–2012.

Atkinson Center for a Sustainable Future, Faculty Fellow, 2009–present.

Information Science, Systems, & Technology, Founding co-Director Undergraduate Program, 2004–2007.

School of Operations Research & Industrial Engineering, Publicity Committee Chair, 2006–2007.

Center for Applied Mathematics, Admissions Committee, 2004–2007.

College of Engineering, CIS Building Feasibility Study Committee, 2004–2006.

School of Operations Research & Industrial Engineering, Curriculum Committee, 2005–2006.

Center for Applied Mathematics, Colloquium Committee, 2004–2005.

School of Operations Research & Industrial Engineering, Director Search Committee Co-Chair, 2004–2005.

School of Operations Research & Industrial Engineering, Curriculum Committee Chair, 2003–2004.

School of Operations Research & Industrial Engineering, Associate Director for Graduate Studies, 2000–2003.

Center for Applied Mathematics, Colloquium Committee, 2000–2001.

Search Committee for Dean of Graduate School, 2000–2002.

School of Operations Research & Industrial Engineering, Acting Associate Director for Undergraduate Studies, 1998–1999.

College of Engineering, Search Committee for Associate Dean for Professional Development, 1998.

College of Engineering, Search Committee for Associate Dean for Undergraduate Studies, 1999.

College of Engineering, Common Curriculum Governing Board, 1998–1999.

School of Operations Research & Industrial Engineering, Curriculum Committee, Chair, 1996–1998.

Center for Applied Mathematics, Colloquium Committee, 1997–1998.

Center for Applied Mathematics, Computing Committee, Chair, 1996–1997.

College of Engineering, Committee on Academic Standards, Petitions, and Credits (ASPAC), 1994–1999.

Center for Applied Mathematics, Computing Committee, 1995–1996.

Graduate College, Sage Fellowship Committee, 1994–1995.

College of Engineering, Computing Policy Committee, 1994–1996.

School of Operations Research & Industrial Engineering, Computing Committee, Chair, 1991–1992, 1994–1996.

School of Operations Research & Industrial Engineering, Computing Committee, 1990–1991.

School of Operations Research & Industrial Engineering, Ph.D. Qualifying Examination Coordinator, 1989–1990, 1992–1993.

## **Graduate Student Advising**

### **M.S. Advising**

Philip Klein, June 1986, *An Efficient Parallel Algorithm for Planarity Testing* (MIT-CS).

Margaret Tuttle, August 1989, *Observations on the Mixed Postman Problem* (MIT-CS).

Cliff Stein, August 1989, *Using Cycles and Scaling in Parallel Algorithms* (MIT-CS).

David Williamson, June 1990, *Analysis of the Held-Karp Heuristic for the Traveling Salesman Problem* (MIT-CS).

Volker Lucks, December 1991, *Large-Step Local Optimization for the Graph Partitioning Problem* (Cornell-OR).

### **Ph.D. Advising**

Philip Klein, August 1988, *Efficient Parallel Algorithms for Planar, Chordal and Interval Graphs* (MIT-CS). [Currently on the faculty at Brown University]

Leslie Hall, August 1989, *Topics in Combinatorial Optimization* (MIT-OR). [Currently adjunct faculty at The Johns Hopkins University]

Joel Wein, June 1991, *Algorithms for Scheduling and Network Problems* (MIT-Applied Math). [Currently at Google Research, NYC]

Clifford Stein, August 1992, *Approximation Algorithms for Multicommodity Flow and Shop Scheduling Problems* (MIT-CS). [Currently on the faculty of Columbia University]

Alessandro Panconesi, June 1993, *Locality in Distributed Computing* (Cornell-CS). [Currently on the faculty at La Sapienza, Rome]

Aravind Srinivasan, August 1993, *Techniques for Probabilistic Analysis and Randomness-Efficient Computation* (Cornell-CS). [Currently on the faculty at the University of Maryland, College Park]

Helena Lourenco, August 1993, *Algorithms and Computational Experiments for the Job-shop Scheduling Problem* (Cornell-OR). [Currently on the faculty at the Universitat Pompeu Fabra, Barcelona]

Paul Martin, August 1996, *A Time-Oriented Approach to Solving Job-shop Scheduling Problems* (Cornell-OR).

Fabian Chudak, August 1998, *Approximation Algorithms for the Uncapacitated Facility Location Problem* (Cornell-OR). [Currently at D-Wave Systems]

Mark Huber, June 1999, *Efficient Algorithms for Exact Sampling* (Cornell-OR). [Currently on the faculty at Claremont McKenna College]

Dan Brown, August 2000, *New Algorithms for Genetic Linkage Mapping Projects* (Cornell-CS). [Currently on the faculty of the University of Waterloo]

Nathan Edwards, January 2001, *Computing Near-optimal Solutions for Network Design Problems* (Cornell-OR). [Currently on the faculty of Georgetown University]

Chaitanya Swamy, June 2004, *Approximation Algorithms for Clustering Problems* (Cornell-CS). [Currently on the faculty of the University of Waterloo]

Retsef Levi, August 2005, *Computing Provably Near-Optimal Policies for Stochastic Inventory Control Models* (Cornell-OR). [Currently on the faculty of MIT]

Ranjith Rajagopalan, August 2005, *Algorithms for Some Clustering Problems* (Cornell-OR). [Currently at a video game startup]

Davina Kunvipusilkul, December 2006, *Integer Programming Methods for Scheduling with Chain Constraints with Bounded Lags* (Cornell-OR). [Currently at the Bank of Thailand]

Frans Schalekamp, June 2007, *Algorithms for Universal and A Priori Optimization Problems*. [Currently at the College of William & Mary]

Tim Carnes, June 2010, *Approximation Algorithms vis the Primal-Dual Schema*.

Gwen Spencer, May 2012, *Approximation Algorithms for Stochastic Combinatorial Optimization, with Applications in Sustainability*. [Currently at Smith College]

Maurice Cheung, May 2012, *LP-based Approximation Algorithms for Scheduling and Inventory Management Problems*. [Currently at Disney.]

Hyung-Chan An, August 2012, *LP-based Approximation Algorithms for the TSP and Related Problems*. [Currently at EPFL]

Thesis committee member for other students' Ph.D.: Paul Feldman, Gerard Kindervater, Andrew Boyd, Seth Malitz, Mark Newman, Richard Koch, Cindy Phillips, Joe Kilian, Lance Fortnow, Hershel Safer, Yale Herer, Robert Koca, Suresh Chari, Theresa Wise, Wee-Liang Heng, Wei Chen, Pan Chen, Nikolay Mateev, Michael Wagner, Tim Roughgarden, Amit Kumar, Aaron Archer, Soumyadip Ghosh, Martin Pí, Tom Wexler, Elliot Anshelevich, Millie Chu, Ara Hayrapetyan, Sumit Kunnunkal, Zoya Svitkina, Nikolai Blizniouk, Jaraslaw Byrka, Vivek Vishnamurthy, Sigmund Cherem, Megan Owen, Hui Qu, Anke van Zuylen, Seung Keun Yoon, Edward Hua, Joseph Broder, Bistra Dilkina, Yookyung Jo, Chao Ding, Renato Paes Leme.

## Publications in Refereed Journals

- 1984 “Recognizing graphs with fixed interval number is  $NP$ -complete, with D.B. West, *Discrete Applied Mathematics* 8, 295–305.
- 1985 “A best possible heuristic for the  $k$ -center problem”, with D.S. Hochbaum, *Mathematics of Operations Research* 10, 180–184.
- “An  $O(|V|^2)$  algorithm for the planar 3-cut problem”, with D.S. Hochbaum, *SIAM J. Alg. and Disc. Methods* 6, 707–712.



- 1986 “Best possible heuristics for the bottleneck wandering salesman and bottleneck vehicle routing problems”, with D.S. Hochbaum, *European Journal of Operations Research*, 380–384.
- “A better than ‘best possible’ algorithm to edge color multigraphs”, with D.S. Hochbaum and T. Nishizeki, *J. of Algorithms* 7, 79–104.
- “A packing problem you can almost solve by sitting on your suitcase”, with D.S. Hochbaum, *SIAM J. Alg. and Disc. Methods* 7, 247–257.
- “A unified approach to approximation algorithms for bottleneck problems”, with D.S. Hochbaum, *J. Assoc. Comput. Mach.* 33, 533–550. [A preliminary version appeared in *Proc. of the 16th Annual ACM Symposium on Theory of Computing*, 1984, 274–284.]
- 1987 “Using dual approximation algorithms for scheduling problems: theoretical and practical results”, with D.S. Hochbaum, *J. Assoc. Comput. Mach.* 34, 144–162. [A preliminary version appeared in *Proc. of the 26th Annual IEEE Symposium on Foundations of Computer Science*, 1985, 79–89.]
- “Efficient parallel algorithms for edge coloring problems”, with H.J. Karloff, *J. of Algorithms* 8, 39–52.
- 1988 “A polynomial approximation scheme for scheduling uniform processors: using the dual approach”, with D.S. Hochbaum, *SIAM J. Computing* 17, 539–551. [A preliminary version appeared in *Proc. of Foundations of Software Technology and Theoretical Computer Science '86*, Lecture Notes in Computer Science 231, Springer-Verlag, 1987, 382–393.]
- 1989 “The parallel complexity of the TSP”, with G. Kindervater and J.K. Lenstra, *J. of Algorithms* 10, 249–270.
- “Simple constant-time consensus protocols in realistic failure models”, with B. Chor and M. Merritt, *J. Assoc. Comput. Mach.* 36, 591–614. [A preliminary version appeared in *Proc. of the 4th Annual ACM Symposium on Principles of Distributed Computing*, 1985, 152–162.]
- 1990 “Approximation algorithms for scheduling unrelated parallel machines”, with J.K. Lenstra and É. Tardos, *Mathematical Programming* 46, 259–271. [A preliminary version appeared in *Proc. of the 28th Annual IEEE Symposium on Foundations of Computer Science*, 1987, 217–224.]
- “Flipping persuasively in constant expected time”, with C. Dwork and L. Stockmeyer, *SIAM J. Computing* 19, 472–499. [A preliminary version appeared in *Proc. of the 27th Annual IEEE Symposium on Foundations of Computer Science*, 1986, 222–232.]
- “Analyzing the Held-Karp TSP bound: A monotonicity property with application”, with D.P. Williamson, *Information Processing Letters* 35, 281–285.
- 1991 “Permutation vs. non-permutation flow shop schedules”, with C.N. Potts and D.P. Williamson, *Operations Research Letters* 10, 281–284.
- 1992 “Jackson’s rule for single-machine scheduling: making a good heuristic better”, with L.A. Hall, *Mathematics of Operations Research* 17, 22–35.
- “Using interior point methods for fast parallel algorithms for bipartite matching and related problems”, with A.V. Goldberg, S.A. Plotkin, and É. Tardos, *SIAM J. Computing* 21, 140–150. [A preliminary version appeared in *Proc. of the 30th Annual IEEE Symposium on Foundations of Computer Science*, 1989, 350–355.]

- 1993 “An approximation algorithm for the generalized assignment problem”, with É. Tardos, *Math. Programming* 62, 461–474. [A preliminary version appeared in *Proc. of the 4th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1993, 448–454.]
- 1994 “Improved approximation algorithms for shop scheduling problems”, with C. Stein and J. Wein, *SIAM J. Computing* 23, 617–632. [A preliminary version appeared in *Proc. of the 2nd Annual ACM-SIAM Symposium on Discrete Algorithms*, 1991, 148–157.]
- 1995 “Scheduling parallel machines on-line”, with J. Wein and D.P. Williamson, *SIAM J. Computing* 24, 1313–1331. [A preliminary version appeared in *Proc. of the 32nd Annual IEEE Symposium on Foundations of Computer Science*, 1991, 131–140.]
- “Approximation algorithms for fractional packing and covering problems”, with S.A. Plotkin and É. Tardos, *Math. Oper. Res.* 20, 257–301. [A preliminary version appeared in *Proc. of the 32nd Annual IEEE Symposium on Foundations of Computer Science*, 1991, 495–504.]
- 1996 “Strategic directions in research in theory of computing”, with M. C. Loui, A. Condon, F. Fich, G. N. Frederickson, A. V. Goldberg, D. S. Johnson, S. Mahaney, P. Raghavan, J. Savage, and A. L. Selman, *ACM Computing Surveys* 28, 575–590.
- 1997 “Short shop schedules”, with D.P. Williamson, L.A. Hall, J.A. Hoogeveen, C.J. Hurkins, J.K. Lenstra, S.V. Sevast’janov, *Oper. Res.* 45, 288–294.
- “Scheduling to minimize the average completion time: on-line and off-line approximation algorithms”, with L. A. Hall, A. S. Schulz, and J. Wein, *Math. Oper. Res.* 22, 513–544. [A preliminary version appeared in *Proc. of the 7th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1996, 142–151.]
- “Approximation algorithms”, with A.S. Schulz and D.P. Williamson, *Proceedings of the National Academy of Sciences*, November 25, 1997, 94, 12734–12735.
- 1998 “Improved bounds on relaxations of a parallel machine scheduling problem”, with C. A. Phillips, A. S. Schulz, C. Stein, and J. Wein, *J. Comb. Optimization* 1, 413 – 426.
- 1999 “Approximation algorithms for precedence-constrained scheduling problems constraints on parallel machines that run at different speeds”, with F.A. Chudak, *J. Algorithms* 30, 323–343. [Special issue dedicated to selected papers from SODA ’97. A preliminary version appeared in *Proc. of the 8th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1997, 581–590.]
- “Improved approximation algorithms for the k-level facility location problem”, with K. Aardal and F. A. Chudak, *Info. Proc. Lett.* 72, 161–167.
- 2000 “Selective mapping: a strategy for optimizing the construction of high-density linkage maps”, with T. J. Vision, D. G. Brown, R. T. Durrett and S. D. Tanksley, *Genetics* 155, 407–420.
- 2002 “A constant-factor approximation algorithm for the k-median problem”, with M. Charikar, S. Guha, and É. Tardos, *J. Comput. System Sciences* 65, 129–149. [Invited paper for special issue for FOCS ’99. A preliminary version appeared in *Proceedings of the 31st Annual ACM Symposium on Theory of Computing*, 1–10].
- 2003 “Improved approximation algorithms for the uncapacitated facility location problem”, with F. Chudak, *SIAM J. on Computing* 33, 1–25.

- 2004 “An improved approximation algorithm for the partial latin square extension problem”, with C.P. Gomes, and R.G. Rommel. *Operations Research Letters* 32, 479–484. [A preliminary version appeared in *Proceedings of the 14th Annual ACM-SIAM Symposium on Discrete Algorithms*, 2004, 832–833.]
- “Approximations and randomization to boost CSP techniques”, with Carla P. Gomes. *Annals of Operations Research* 130, 117–141. [A preliminary version appeared in *Proceedings of the 4th International Workshop on the Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems*, 291–305.]
- 2006 “Primal-dual algorithms for deterministic inventory problems”, with R. Levi and R. Roundy. *Mathematics of Operations Research* 31, 267–284. [A preliminary version appeared in *Proceedings of the 36th Annual Symposium on Theory of Computing*, 2004, 353–362.]
- “An approximation scheme for stochastic linear programming and its application to stochastic integer programs”, with C. Swamy. *Journal of the ACM* 53, 978–1012. [A preliminary version appeared in *Proceedings of the 45th Annual IEEE Symposium on Foundations of Computer Science*, 2004, 228–237.]
- 2007 “Approximation algorithms for stochastic inventory control models”, with R. Levi, M. Pál, and R. Roundy. *Mathematics of Operations Research* 32, 284–302. [A preliminary version appeared in *Proceedings of the 11th MPS Conference on Integer Programming and Combinatorial Optimization*, 2005, 306–320.]
- “Provably near-optimal sampling-based policies for stochastic inventory control models”, with R. Levi and R. Roundy. *Mathematics of Operations Research* 32, 821–839. [A preliminary version appeared in *Proceedings of the 38th Annual ACM Symposium on Theory of Computing*, 2006, 739–748.]
- 2008 “A constant approximation algorithm for the one-warehouse multi-retailer problem”, with R. Levi, R. Roundy, and M. Sviridenko. *Management Science* 54, 763–776. [A preliminary version appeared in *Proceedings of the 15th Annual ACM-SIAM Symposium on Discrete Algorithms*, 2005, 365–374.]
- “Algorithms for the universal and a priori TSP”, with F. Schalekamp. *Operations Research Letters* 36, 1–3.
- “Fault-tolerant facility location”, with C. Swamy. *ACM Transactions on Algorithms* 4. [A preliminary version appeared in *Proceedings of the 14th Annual ACM-SIAM Symposium on Discrete Algorithms*, 2004, 735–736.]
- “Approximation algorithms for capacitated stochastic inventory control problems”, with R. Levi, R. Roundy, and V.A. Truong. *Operations Research* 56, 1186–1199.
- 2009 “Sum-of-ratios optimization with a capacity constraint”, with P. Rusmevichientong, and Z.J. Max Shen, *Operations Research Letters* 37, 230–238.
- 2010 “Dynamic Assortment Optimization with a Multinomial Logit Choice Model and Capacity Constraint”, with P. Rusmevichientong and Z.-J. M. Shen, *Operations Research* 58, 1666–1680.

- 2011 “Approximation algorithms for supply chain planning and logistics problems with market choice”, with R. Levi, J. Geunes, and E. Romeijn, *Mathematical Programming* 130 85–106. [Preliminary version appeared in *Proceedings of the 11th MPS Conference on Integer Programming and Combinatorial Optimization*, 2005, 111–124.]
- “Use of a novel application to optimize aircraft utilization for non-urgent patient transfers”, with R. MacDonald, M. Ahghari, T.A. Carnes, and S.G. Henderson, *Air Medical Journal* 30, 255.
- 2012 “LP-based approximation algorithms for capacitated facility location”, with R. Levi and C. Swamy, *Mathematical Programming* 131, 365–379 . [Preliminary version appeared in *Proceedings of the 10th MPS Conference on Integer Programming and Combinatorial Optimization*, 2004, 206–218.]
- “Sampling-based approximation algorithms for multi-stage stochastic optimization”, with C. Swamy, *SIAM J. on Computing* 41, 975–1004. [Preliminary version appeared in *Proceedings of the 45th Annual IEEE Symposium on Foundations of Computer Science*, 2005, 357–366.]
- 2013 “Mathematical programming guides air-ambulance routing at Ornge”, with T. A. Carnes, S. .G. Henderson, M. Ahgari, and R. Macdonald, *Interfaces* 43, 232–239.
- 2014 “Primal-dual schema for capacitated covering problems”, with T. A. Carnes, *Mathematical Programming A*, 1–20, electronically published. [Preliminary version appeared in *Proceedings of Integer Programming and Combinatorial Optimization*, 2008, 288–302.]
- “Assortment optimization under the multinomial logit model with random choice parameters”, with P. Rusmevichientong, C. Tong, and H. Topaloglu. *Production and Operations Management*, 23, 2023–2039, 2014.
- 2015 “Approximation algorithms for fragmenting a graph against a stochastically-located threat”, with G. Spencer. *Theory Comput. Syst.* 56, 96–134. [Preliminary version appeared in *Proceedings of the 9th Annual Workshop on Approximation and Online Algorithms, Lecture Notes in Computer Science*, 7164.]

### Other Publications In Selective Conference Proceedings

“Data Analysis and Optimization for (Citi)Bike Sharing,” with Eoin O’Mahony, *Proceedings of the 29th Conference on Artificial Intelligence (AAAI)*, 2015, 687–694.

“Improving Christofides’ algorithm for the  $s$ - $t$  path TSP,” with H.-C. An and R. Kleinberg, *Proceedings of the 44th Annual ACM Symposium on Theory of Computing*, 2012, 875–886.

“A Primal-Dual Approximation Algorithm for Min-Sum Single-Machine Scheduling Problems”, with M. Cheung, *Proceedings of APPROX-RANDOM 2011*, 135–146.

“Primal-Dual Schema and Lagrangian Relaxation for the  $k$ -Location-Routing Problem”, with T. Carnes, *Proceedings of APPROX-RANDOM 2011*, 99–110.

“Approximation Algorithms for the Bottleneck Asymmetric Traveling Salesman Problem”, with H.-C. An and R.D. Kleinberg, *Proceedings of APPROX-RANDOM 2010*, 2010, 1–11

“Improved Lower Bounds for the Universal and a priori TSP”, with I. Gorodezky, R.D. Kleinberg, and G. Spencer, *Proceedings of APPROX-RANDOM 2010*, 2010, 178–191

- “Maximizing Spread of Cascades Using Network Design”, with D. Sheldon, B. Dilkina, A. Elmachtoub, R. Finseth, A. Sabharwal, J. Conrad, C. Gomes, D. Shmoys, W. Allen, O. Amundsen, W. Vaughan. *Proceedings of the 16th Conference on Uncertainty in Artificial Intelligence: UAI2010*, 2010.
- “A constant approximation algorithm for the *a priori* traveling salesman problem”, with K. Talwar. *Proceedings of the 13th MPS Conference on Integer Programming and Combinatorial Optimization*, 2008, 331–343.
- “Approximation algorithms for 2-stage stochastic scheduling problems”, with M. Sozio, *Proceedings of the 12th MPS Conference on Integer Programming and Combinatorial Optimization*, 2007, 145–157.
- “Facility location with service installation costs”, with C. Swamy and R. Levi. *Proceedings of the 15th Annual ACM-SIAM Symposium on Discrete Algorithms*, 2004, 1081–1090.
- “Lagrangian relaxation for the k-median problem: new insights and continuity properties”, with A. Archer and R. Rajagopalan. *Proceedings of the 11th Annual European Symposium on Algorithms*, 2003, 31–42.
- “Improved approximation algorithms for capacitated facility location problems”, with F.A. Chudak, *Proceedings of the 10th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1999, S875–S876.
- “Approximation algorithms for facility location problems”, with É. Tardos, and K. I. Aardal. *Proceedings of the 29th Annual ACM Symposium on Theory of Computing*, 1997, 265–274.
- “A new approach to computing optimal schedules for the job-shop scheduling problem”, with P. Martin, in: Cunningham, W.H., S.T. McCormick, M. Queyranne, eds. *Integer Programming and Combinatorial Optimization*, Proceedings of the 5th International IPCO Conference, *Lecture Notes in Computer Science 1084*, Springer, Berlin, 1996, 389–403.
- “Improved scheduling algorithms for minsum criteria” with S. Chakrabarti, C.A. Phillips, A.S. Schulz, C. Stein, and J. Wein, in: F. Meyer auf der Heide and B. Monien, eds. *International Colloquium on Automata, Languages and Processing*, Proceedings of the 23rd International Colloquium ICALP’96, *Lecture Notes in Computer Science 1099*, Springer, Berlin, 646–657.
- “Improved approximation algorithms for network design problems”, with M.X. Goemans, A.V. Goldberg, S. Plotkin, É. Tardos, and D.P. Williamson, *Proceedings of the 5th Annual ACM-SIAM Symposium on Discrete Algorithms*, 1994, 223–232.
- “Near-optimal sequencing with precedence constraints”, with L.A. Hall, *Proceedings of the 1st Mathematical Programming Conference on Integer Programming and Combinatorial Optimization*, 1990, 249–260.
- “Approximation schemes for constrained scheduling problems”, with L.A. Hall, *Proceedings of the 30th Annual IEEE Symposium on Foundations of Computer Science*, 1989, 134–139.
- “A best possible parallel approximation algorithm for a graph theoretic problem”, with D.S. Hochbaum, *Proceedings of IFORS ’87*, 933–938.

## Invited Survey Articles

“Well-solved cases of the traveling salesman problem”, with P.C. Gilmore and E.L. Lawler, in *The Traveling Salesman Problem*, edited by E.L. Lawler, J.K. Lenstra, A.H.G. Rinnooy Kan, and D.B. Shmoys, Wiley, 1985, 87–143.

“Computational complexity”, with É. Tardos, in *The Handbook of Combinatorics*, edited by R.L. Graham, M. Grötschel and L. Lovász, North-Holland, 1995, 1599–1645. (An extended version appears as Technical Report No. 918, School of Operations Research and Industrial Engineering, Cornell University, Ithaca, NY, 1990.)

“Combinatorics in computer science”, with L. Lovász and É. Tardos, in *The Handbook of Combinatorics*, edited by R.L. Graham, M. Grötschel and L. Lovász, North-Holland, 1995, 2003–2038.

“Sequencing and scheduling: algorithms and complexity”, with E.L. Lawler, J.K. Lenstra and A.H.G. Rinnooy Kan, *The Handbooks of Operations Research and Management Science, Volume IV: Logistics of Production and Inventory*, edited by S.C. Graves, A.H.G. Rinnooy Kan, P. Zipkin, North-Holland, 1993, 445–522.

“Computing near-optimal solutions to combinatorial optimization problems”, *Advances in Combinatorial Optimization*, edited by W. Cook, L. Lovász, P. Seymour, AMS, 1995, 355–397.

“Computing near-optimal schedules”, with J.K. Lenstra, *Scheduling Theory and its Applications*, edited by P. Chrétienne, E.G. Coffman, Jr., J.K. Lenstra, and Z. Liu, Wiley, 1995, 1–14.

“[Approximation algorithms for] Cut problems and their application to divide-and-conquer”, *Approximation Algorithms*, edited by D.S. Hochbaum, PWS, 1997, 192–235.

“Using linear programming in the design and analysis of approximation algorithms: two illustrative problems”, *Approximation Algorithms for Combinatorial Optimization, Lecture Notes in Computer Science 1444*, edited by K. Jansen and J. Rolim, Springer, Berlin, 1998, 15–32.

“Approximation algorithms for clustering problems”, *Proceedings of COLT '99*, 1999, 100–101.

“Approximation algorithms for facility location problems”, *Approximation Algorithms for Combinatorial Optimization, APPROX 2000, Lecture Notes in Computer Science 1913*, edited by K. Jansen and S. Khuller, Springer, Berlin, 2000, 27–33.

“The design and analysis of approximation algorithms: facility location as a case study.” *Trends in Optimization*, edited by S. Hosten, J. Lee, and R. Thomas. AMS Proceedings of Symposia in Applied Mathematics, Volume 61, 2004, 85–97.

“Approximation algorithms for 2-stage stochastic optimization problems.” *Proceedings of FSTTCS 2006, the 26th International Conference on Foundations of Software Technology and Theoretical Computer Science*, 2006, 5–19. [A preliminary version appeared in *ACM SIGACT News* 37, 2006, 33–46.]

## Books

*The Design of Approximation Algorithms*, with D.P. Williamson, Cambridge University Press, 2011.

*The Traveling Salesman Problem: A Guided Tour of Combinatorial Optimization*, edited with E.L. Lawler, J.K. Lenstra, and A.H.G. Rinnooy Kan, John Wiley & Sons, Chichester, 1985.

*Selected publications of Eugene L. Lawler*, edited with K. Aardal, J.K. Lenstra, and F. Maffioli, CWI Tract 126, 1999.

## **Selected Invited Lectures**

### *Computational Sustainability*

1. McMaster University, March 2012.
2. DIMACS Workshop on US-China Collaborations in Computer Science and Sustainability, October 2011.
3. American Institute of Mathematics, Palo Alto, CA, March 2011.
4. 3rd US-China CS Leadership Summit, Beijing, China, June 2010.
5. CCF CFC-2010 (Conference on Future Computing), Changsha, China, June 2010.
6. National Research Council Panel on Computing Research for Environmental and Societal Sustainability, July 2010.

### *Improving Christofides' Algorithm with Randomization and LP*

1. University of Illinois, Chicago, Distinguished Lecture Series, October 2014.
2. Cornell University, Computer Science Colloquium, September 2014.
3. Harvey Mudd College, July 2014.
4. IPCO Summer School, Bonn, June 2014.
5. Lehigh University, April 2014.
6. ICERM, Joint Colloquium with Department of Computer Science, February 2013.
7. EPFL, November 2013.
8. Alan Goldman Lecture, The Johns Hopkins University, February 2013.
9. Third Cargese Workshop on Combinatorial Optimization, Plenary Tutorial Lecture Series, September 2012.
10. IEOR-DRO Seminar, Columbia University, October 2012.
11. Flexible Network Design Workshop, Warsaw, July 2012.
12. McMaster University, March 2012.
13. BIRS Workshop on Approximation Algorithms, November 2011.
14. Oberwolfach Workshop on Combinatorial Optimization, November 2011.
15. Informal Discrete Optimization Seminar, Technical University-Berlin, November 2011.

### *Strong LP formulations and primal-dual approximation algorithms*

1. International Symposium on Mathematical Programming, Berlin, August 2012.
2. Combined Discrete Optimization Seminar, Technical University-Berlin, November 2011.

3. Joint IEOR Colloquium and CS Theory Seminar, UC Berkeley, October 2011.
4. 10th Workshop on Models and Algorithms for Planning and Scheduling Problems (MAPSP), Invited Plenary Lecture, Nymburg, June 2011.
5. MSR Theory Colloquium, Microsoft New England Research and Development Center, May 2011.
6. Operations Research Colloquium, Management Science and Engineering Department, Stanford, January 2011.
7. MSR Theory Seminar, Microsoft Silicon Valley Research Center, January 2011.
8. Joint Operations Research Center and Laboratory for Information and Decision Sciences Colloquium, MIT, December 2010.
9. Distinguished Lecture Series, Department of Computer Science, Brown University, September 2010.

*Strong LP formulations in the design and analysis of approximation algorithms*

1. International Symposium on Mathematical Programming, Semi-Plenary Lecture, Chicago, 2009.

*Approximation algorithms for stochastic sequencing and scheduling problems*

1. Dagstuhl Workshop on Scheduling, invited survey, Dagstuhl, February 2010.

*Approximation algorithms for the a priori TSP*

1. INFORMS Annual Meeting, San Diego, October 2009.
2. Department of Computer Science, Dartmouth University, July 2008.
3. Summer School lecture, New Algorithmic Paradigms in Optimization, Ascona, June 2008
4. 13th MPS Conference on Integer Programming and Combinatorial Optimization, May 2008
5. JKL60, Eindhoven, The Netherlands, December 2007
6. Dagstuhl Workshop on Randomization and Algorithms, September 2007

*Approximation algorithms for stochastic optimization problems*

1. ADFOCS 2009, Short Course Tutorial, Max Planck Institute, Saarbrücken, September 2009.
2. Summer School tutorial, New Algorithmic Paradigms in Optimization, ETH Zurich, June 2008
3. Tutte Seminar, Waterloo, April 2008
4. Microsoft Research Colloquium, January 2008
5. Columbia Distinguished IEOR-DRO Seminar, December 2007
6. 26th Conference on Foundations of Software Technology and Theoretical Computer Science, Invited Plenary Speaker, Kolkata, India, December 2006
7. MIT LCS Distinguished Theoretical Computer Science Colloquium, November 2006
8. Theory-Fest, IBM T.J. Watson Research Center, July 2006
9. Sixth Haifa Workshop on Interdisciplinary Applications of Graph Theory, Combinatorics, and Algorithms, May 2006



10. Tsinghua University, March 2006
11. Aussois Workshop on Combinatorial Optimization, January 2006
12. New Horizons in Computing, Recent Trends in Theoretical Computer Science, Invited Plenary Speaker, Kyoto, February 2005
13. Bertinoro Workshop on Combinatorial Optimization, May 2004

*Approximation algorithms for stochastic inventory problems*

1. INFORMS Annual Meeting, invited extended tutorial, November 2007
2. Cowles Workshop on Optimization, Yale, March 2007
3. Workshop on Recent Advances in Approximation Algorithms, Kolkata, December 2006
4. International Symposium on Mathematical Programming, Rio de Janeiro, August 2006

*Approximation algorithms via linear programming*

1. IBM Almaden Research Center, May 2000.
2. UC Berkeley, IEOR Colloquium, February 2000.
3. DIMACS Workshop on Large-Scale Discrete Optimization in Logistics, February 1999.
4. Oberwolfach Workshop on Combinatorial Optimization, January 1999.
5. INFORMS Fall '98, Seattle, Washington, October 1998 (Tutorial)
6. APPROX '98, Aalborg, Denmark, July 1998.
7. 3rd Annual German-American Frontiers of Science Symposium, sponsored by the German American Academic Council in conjunction with the U.S. National Academy of Sciences and the Max Planck Society, June 1997.
8. Summer School on Approximation Algorithms, Berlin, June 1996.

*Approximation algorithms for facility location and clustering problems*

1. ADFOCS '01, Saarbrücken, September 2001 (summer school series).
2. CONF 2000, Saarbrücken, September 2000 (invited plenary talk).
3. CO 2000, Greenwich, July 2000 (invited plenary talk).
4. University of Southern California, Department of Computer Science, Distinguished Lecturer Series, February 2000.
5. Dagstuhl Workshop on Semi-definite Programming, Linear Programming, and Randomization in Combinatorial Optimization, January 2000.
6. COLT '99, Santa Cruz, July 1999 (invited survey).
7. The Johns Hopkins University, Department of Mathematical Sciences,

*Optimization methods in computing genetic linkage maps*

1. IBM Watson Research Center, July 1999.
2. NIH Symposium: From Genes to Proteins to Biological Function, October 2000.

3. Computer Science Colloquium, La Sapienza, Rome, May 2004.

*Approximation algorithms for scheduling problems*

1. UC Berkeley, CS Theory Seminar, October, 1999 (marking the 5th anniversary of Gene Lawler's death).
2. IBM Watson/Hawthorne Research Center, July 1999 (extended tutorial).

## **Grant Support**

“Advances in the design of approximation algorithms for optimization problems”, PI, NSF, 9/10–8/15.

“Computing research infrastructure for constraint optimization, machine learning, and dynamical models for computational sustainability”, co-PI, NSF, 7/11–6/12.

“Computational Sustainability: computational methods for a sustainable environment, economy and society”, co-PI, NSF, 8/08–8/13.

“Managing Sources of Uncertainty for Sustainable Resource Management”, co-investigator, Cooch, Blossy, Decker, Stedman, Stedinger, Conrad, Kraft, Gomes, and Shmoys, Cornell CCSF, 2009, funded workshop, Summer 2009

“Approximation algorithms for discrete stochastic and deterministic optimization problems”, PI, NSF, 10/06–9/10.

“Collaborative Research: Algorithms for Near-Optimal Multistage Decision-Making under Uncertainty: Online Learning from Historical Samples”, co-PI, NSF, 9/07–8/10.

“Supply Chain Asset Configuration via Approximation Algorithms”, co-PI, NSF, 5/05–4/08.

“Approximation algorithms for scheduling, packing, and related logistics problems”, PI, NSF, 9/04–8/07.

“Supply chain asset configurations via approximation algorithms”, Co-PI, NSF, 5/05–4/07.

“The design, analysis, and application of approximation algorithms”, PI, NSF, 7/00–6/04.

“Computational and mathematical investigations in optimization”, Co-Investigator, NSF, 7/98–6/01.

“Approximation algorithms via linear programming”, PI, NSF, 7/97–6/00.

“Computational and mathematical investigations in optimization”, NSF, ONR, Co-Investigator, 9/95–8/98.

“Near-optimal solutions for combinatorial problems: algorithms and complexity”, PI, NSF, 4/94–3/97.

“Computational and mathematical investigations in optimization”, NSF, ONR, AFOSR, Co-Investigator, 8/90–1/94.

“Parallel algorithms and optimization”, United Parcel Service, PI, 9/89–8/92.

“The design and analysis of efficient algorithms”, NSF Presidential Young Investigator Award, with matching support from Procter & Gamble, DuPont, Sun Microsystems, IBM, and UPS, Principal Investigator, 9/87–8/94.