

Jack H. Lutz

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Experience

Iowa State University
Professor of Computer Science, 1996 – present
Professor of Mathematics, 2004 – present
Faculty Member in Bioinformatics and Computational Biology, 2012 – present
Associate Professor of Computer Science, 1992 – 1996
Assistant Professor of Computer Science, 1987 – 1992

University of Cambridge (sabbatical)
Visiting Fellow, Isaac Newton Institute for Mathematical Sciences, Spring 2012

California Institute of Technology (sabbatical)
Visiting Associate, Computing and Mathematical Sciences, Winter 2012

University of Wisconsin (sabbatical)
Visiting Professor of Computer Science, Spring 2006

NEC Research Institute, Princeton, NJ (sabbatical)
Visiting Scientist, Spring 2001

Cornell University (sabbatical)
Visiting Professor of Computer Science, Fall 1997

Rutgers University (sabbatical)
DIMACS Visiting Fellow, Fall 1990

California Institute of Technology
Graduate Research Assistant, 1984–1985, 1986–1987
Graduate Teaching Assistant, 1980–1987

TRW
Member of Technical Staff, July–October 1985
Formal specification and formal verification of security properties of computer systems

University of Kansas

Assistant Instructor, 1977–1980

Research funding (Principal Investigator)

INSPIRE: Robust Molecular Programming: Advances in the Design and Verification of Reliable Self-Assembling Nanosystems (with coPIs Eric Henderson, James I. Lathrop, and Robyn R. Lutz), National Science Foundation, 2012–2015. (\$943,000)

EAGER: Collaborative Research: Modeling and Analysis of Molecular Programming and Nanoscale Self-Assembly (with co-PIs Eric Henderson, James I. Lathrop, Robyn R. Lutz, and Ting Zhang), National Science Foundation, 2011–2013. (\$189,016 at lead institution Iowa State University; \$9,720 at Simpson College)

FRG: Collaborative Research: Algorithmic Randomness, National Science Foundation, 2007–2012. (\$30,000)

Effective Dimensions in the Theory of Computing, National Science Foundation, 2007–2010. (\$125,000)

SGER: Multidisciplinary Aspects of Computation Theory (with co-PI's Pavan Aduri, Krishna B. Athreya, and Vasant Honavar), National Science Foundation, 2003–2006. (\$74,948)

Measure and Information in Computational Complexity, National Science Foundation, 2000–2004. (\$254,902)

Measure and Randomness in Computational Complexity, National Science Foundation, 1997–2000. (\$183,375)

Presidential Young Investigator Award, National Science Foundation, 1991–1997. (\$266,000)

Matching Funds for Presidential Young Investigator Award, Rockwell International, 1991–1992, 1992–1993, 1993–1994, 1994–1995, 1995–1996. (\$100,000)

Matching Funds for Presidential Young Investigator Award, Microware Systems Corporation, 1992–1993, 1993–1994, 1994–1995, 1995–1996. (\$32,000)

Matching Funds for Presidential Young Investigator Award, Amoco Foundation, 1993–1994, 1994–1995. (\$9,000)

IR & D Project, Microelectronic Systems Division, Hughes Aircraft Company, 1990–1991. (\$15,000)

Research Initiation Award, National Science Foundation, 1988–1991. (\$37,906)

Research funding (Co-principal Investigator)

Modelling of Individual Symbolic Sequences (directed by Elvira Mayordomo at the University of Zaragoza), Spanish Ministry of Education and Science, 2005–2008. (30,000 Euros)

Research areas

Molecular Programming and DNA Nanotechnology: universality, robustness, dynamics, specification, and verification of programmable self-assembling nanosystems.

Computational Complexity: complexity in analysis, structure of complexity classes, and resource-bounded measure and dimension.

Algorithmic Information and Randomness: constructive dimension, Kolmogorov complexity,

randomness, prediction, finite-state dimension, and algorithmic fractal geometry.

Education

Ph.D., Mathematics 1987

California Institute of Technology

Thesis: Resource-Bounded Category and Measure in Exponential Complexity Classes

Major Adviser: Alexander S. Kechris

Minor: Computer Science

Minor Adviser: Yaser S. Abu-Mostafa

M.S., Computer Science 1981

University of Kansas

Thesis: Translations Between Indexings of Subrecursive Classes

M.A., Mathematics 1979

University of Kansas

B.G.S., Mathematics 1976

University of Kansas

Papers in refereed journals

- [51] Xiaoyang Gu, Jack H. Lutz, Elvira Mayordomo, and Philippe Moser, Dimension Spectra of Random Subfractals of Self-Similar Fractals, *Annals of Pure and Applied Logic*, to appear.
- [50] Jack H. Lutz, The Frequent Paucity of Trivial Strings, *Information Processing Letters* **114** (2014), pp. 643–645.
- [49] Randall Dougherty, Jack H. Lutz, R. Daniel Mauldin, and Jason Teutsch, Translating the Cantor Set by a Random Real, *Transactions of the American Mathematical Society*, **366** (2014), pp. 3027–3041.
- [48] Jack H. Lutz and Brad Shutters, Approximate Self-Assembly of the Sierpinski Triangle, *Theory of Computing Systems* **51** (2012), pp. 372–400. (invited paper)
- [47] Lance Fortnow, Jack H. Lutz, and Elvira Mayordomo, Inseparability and Strong Hypotheses for Disjoint NP Pairs, *Theory of Computing Systems* **51** (2012), pp. 229–247. (invited paper)
- [46] Xiaoyang Gu and Jack H. Lutz, Effective Dimensions and Relative Frequencies, *Theoretical Computer Science* **412** (2011), pp. 6696–6711.
- [45] Xiaoyang Gu, Jack H. Lutz, and Elvira Mayordomo, Curves That Must Be Retraced, *Information and Computation* **209** (2011), pp. 992–1006.
- [44] James I. Lathrop, Jack H. Lutz, Matthew J. Patitz, and Scott M. Summers, Computability and Complexity in Self-Assembly, *Theory of Computing Systems* **48** (2011), pp. 617–647. (invited paper)

- [43] Jack H. Lutz, A Divergence Formula for Randomness and Dimension, *Theoretical Computer Science* **412** (2011), pp. 166–177. (invited paper)
- [42] James I. Lathrop, Jack H. Lutz, and Scott M. Summers, Strict Self-Assembly of Discrete Sierpinski Triangles, *Theoretical Computer Science* **410** (2009), pp. 384–405. (invited paper)
- [41] Xiaoyang Gu and Jack H. Lutz, Dimension Characterizations of Complexity Classes, *Computational Complexity* **17** (2008), pp. 459–474.
- [40] Jack H. Lutz and Elvira Mayordomo, Dimensions of Points in Self-Similar Fractals, *SIAM Journal on Computing* **38** (2008), pp. 1080–1112.
- [39] Jack H. Lutz and Klaus Weihrauch, Connectivity Properties of Dimension Level Sets, *Mathematical Logic Quarterly* **54** (2008), pp. 483–491.
- [38] David Doty, Jack H. Lutz, and Satyadev Nandakumar, Finite-State Dimension and Real Arithmetic, *Information and Computation* **205** (2007), pp. 1640–1651.
- [37] Xiaoyang Gu, Jack H. Lutz, and Philippe Moser, Dimensions of Copeland-Erdős Sequences, *Information and Computation* **205** (2007), pp. 1317–1333.
- [36] Krishna B. Athreya, John M. Hitchcock, Jack H. Lutz, and Elvira Mayordomo, Effective Strong Dimension in Algorithmic Information and Computational Complexity, *SIAM Journal on Computing* **37** (2007), pp. 671–705.
- [35] John M. Hitchcock, Jack H. Lutz, and Sebastiaan A. Terwijn, The Arithmetical Complexity of Dimension and Randomness, *ACM Transactions on Computational Logic* **8** (2007), article no. 13.
- [34] John M. Hitchcock and Jack H. Lutz, Why Computational Complexity Requires Stricter Martingales, *Theory of Computing Systems* **39** (2006), pp. 277–296.
- [33] Lance Fortnow and Jack H. Lutz, Prediction and Dimension, *Journal of Computer and System Sciences* **70** (2005), pp. 570–589. (invited paper)
- [32] Stephen A. Fenner, Jack H. Lutz, Elvira Mayordomo, and Patrick Reardon, Weakly Useful Sequences, *Information and Computation* **197** (2005), pp. 41–54.
- [31] Jack H. Lutz, Effective Fractal Dimensions, *Mathematical Logic Quarterly* **51** (2005), pp. 62–72.
- [30] Jack H. Lutz, Computability versus Exact Computability of Martingales, *Information Processing Letters* **92** (2004), pp. 235–237.
- [29] Josef M. Breutzmann, David W. Juedes, and Jack H. Lutz, Baire Category and Nowhere Differentiability for Feasible Real Functions, *Mathematical Logic Quarterly* **50** (2004), pp. 460–472.

- [28] John M. Hitchcock, Jack H. Lutz, and Elvira Mayordomo, Scaled Dimension and Nonuniform Complexity, *Journal of Computer and System Sciences* **69** (2004), pp. 97–122.
- [27] Jack J. Dai, James I. Lathrop, Jack H. Lutz, and Elvira Mayordomo, Finite-State Dimension, *Theoretical Computer Science* **310** (2004), pp. 1–33.
- [26] Jack H. Lutz, The Dimensions of Individual Strings and Sequences, *Information and Computation* **187** (2003), pp. 49–79.
- [25] Jack H. Lutz, Dimension in Complexity Classes, *SIAM Journal on Computing* **32** (2003), pp. 1236–1259.
- [24] Jack H. Lutz and Yong Zhao, The Density of Weakly Complete Problems under Adaptive Reductions, *SIAM Journal on Computing* **30** (2000), pp. 1197–1210.
- [23] David W. Juedes and Jack H. Lutz, Modeling Time-Bounded Prefix Kolmogorov Complexity, *Theory of Computing Systems* **33** (2000), pp. 111–123.
- [22] Josef M. Breutzmann and Jack H. Lutz, Equivalence of Measures of Complexity Classes, *SIAM Journal on Computing* **29** (2000), pp. 302–326.
- [21] James I. Lathrop and Jack H. Lutz, Recursive Computational Depth, *Information and Computation* **153** (1999), pp. 139–172.
- [20] Jack H. Lutz and David L. Schweizer, Feasible Reductions to Kolmogorov–Loveland Stochastic Sequences, *Theoretical Computer Science* **225** (1999), pp. 185–194.
- [19] Amy K. Lorentz and Jack H. Lutz, Genericity and Randomness over Feasible Probability Measures, *Theoretical Computer Science* **207** (1998), pp. 245–259. (invited paper)
- [18] Jack H. Lutz, Observations on Measure and Lowness for Δ_2^P , *Theory of Computing Systems* **30** (1997), pp. 429–442.
- [17] Jack H. Lutz and Elvira Mayordomo, Cook versus Karp/Levin: Separating Completeness Notions if NP is not Small, *Theoretical Computer Science* **164** (1996), pp. 141–163.
- [16] David W. Juedes and Jack H. Lutz, Completeness and Weak Completeness under Polynomial-Size Circuits, *Information and Computation* **125** (1996), pp. 13–31.
- [15] Jack H. Lutz, Weakly Hard Problems, *SIAM Journal on Computing* **24** (1995), pp. 1170–1189.
- [14] Ronald V. Book, Jack H. Lutz, and David M. Martin, Jr., The Global Power of Additional Queries to Random Oracles, *Information and Computation* **120** (1995), pp. 49–54.

- [13] David W. Juedes and Jack H. Lutz, Weak Completeness in E and E_2 , *Theoretical Computer Science* **143** (1995), pp. 149–158.
- [12] David W. Juedes and Jack H. Lutz, The Complexity and Distribution of Hard Problems, *SIAM Journal on Computing* **24** (1995), pp. 279–295.
- [11] David W. Juedes, James I. Lathrop, and Jack H. Lutz, Computational Depth and Reducibility, *Theoretical Computer Science* **132** (1994), pp. 37–70.
- [10] Jack H. Lutz and Elvira Mayordomo, Measure, Stochasticity, and the Density of Hard Languages, *SIAM Journal on Computing* **23** (1994), pp. 762–779.
- [9] Ronald V. Book, Jack H. Lutz, and Klaus W. Wagner, An Observation on Probability versus Randomness with Applications to Complexity Classes, *Mathematical Systems Theory* **27** (1994), pp. 201–209.
- [8] Jack H. Lutz, A Pseudorandom Oracle Characterization of BPP, *SIAM Journal on Computing* **22** (1993), pp. 1075–1086.
- [7] Ronald V. Book and Jack H. Lutz, On Languages With Very High Space-Bounded Kolmogorov Complexity, *SIAM Journal on Computing* **22** (1993), pp. 395–402.
- [6] Jack H. Lutz and William J. Schmidt, Circuit Size Relative to Pseudorandom Oracles, *Theoretical Computer Science* **107** (1993), pp. 95–120. (invited paper)
- [5] Jack H. Lutz, Almost Everywhere High Nonuniform Complexity, *Journal of Computer and System Sciences* **44** (1992), pp. 220–258. (invited paper)
- [4] Jack H. Lutz, On Independent Random Oracles, *Theoretical Computer Science* **92** (1992), pp. 301–307.
- [3] Jack H. Lutz, An Upward Measure Separation Theorem, *Theoretical Computer Science* **81** (1991), pp. 127–135.
- [2] Jack H. Lutz, Pseudorandom Sources for BPP, *Journal of Computer and System Sciences* **41** (1990), pp. 307–320. (invited paper)
- [1] Jack H. Lutz, Category and Measure in Complexity Classes, *SIAM Journal on Computing* **19** (1990), pp. 1100–1131.

Invited book chapters

- [4] Jack H. Lutz and Elvira Marordomo, Twelve Problems in Resource-Bounded Measure, in G. Paun, G. Rozenberg, and A. Salomaa (eds.), *Current Trends in Theoretical Computer Science: Entering the 21st Century*, World Scientific Press, 2001, pp. 83–101.

- [3] Jack H. Lutz, The Quantitative Structure of Exponential Time, in L. A. Hemaspaandra and A. L. Selman (eds.), *Complexity Theory Retrospective II*, Springer-Verlag, 1997, pp. 225–254.
- [2] Amy K. Lorentz and Jack H. Lutz, Genericity and Randomness over Feasible Probability Measures, in D.-Z. Du and K.-I. Ko (eds.), *Advances in Algorithms, Languages, and Complexity*, Kluwer Academic Publishers, 1997, pp. 171–187.
- [1] David W. Juedes and Jack H. Lutz, Kolmogorov Complexity, Complexity Cores, and the Distribution of Hardness, in O. Watanabe (ed.), *Kolmogorov Complexity and Computational Complexity*, Springer-Verlag, 1992, pp. 43–65.

Conference papers

- [60] Sam Ellis, Eric R. Henderson, Titus H. Klinge, James I. Lathrop, Jack H. Lutz, Robyn R. Lutz, Divita Mathur, and Andrew S. Miner, Automated Requirements Analysis for a Molecular Watchdog Timer, *Proceedings of the Twenty-ninth IEEE/ACM International Conference on Automated Software Engineering* (ASE 2014, Vasteras, Sweden, September 15–19, 2014), to appear.
- [59] Jack H. Lutz and Neil Lutz, Lines Missing Every Random Point, *Language, Life, Limits: Proceedings of the Tenth Conference on Computability in Europe* (CiE 2014, Budapest, Hungary, June 23–27, 2014), Springer, 2014, pp. 283–292.
- [58] Adam Case and Jack H. Lutz, Mutual Dimension, *Proceedings of the Thirtieth Symposium on Theoretical Aspects of Computer Science* (STACS 2013, Kiel, Germany, February 27–March 2, 2013) Schloss Dagstuhl LZI, 2013, pp. 116–126.
- [57] David S. Doty, Jack H. Lutz, Matthew J. Patitz, Robert T. Schweller, Scott M. Summers, and Damien Woods, The Tile Assembly Model Is Intrinsically Universal, *Proceedings of the Fifty-third Annual IEEE Symposium on Foundations of Computer Science* (FOCS 2012, New Brunswick, NJ, October 20–23, 2012), pp. 302–310.
- [56] Robyn R. Lutz, Jack H. Lutz, James I. Lathrop, Titus H. Klinge, Divita Mathur, D. M. Stull, Taylor G. Bergquist, and Eric R. Henderson, Requirements Analysis for a Product Family of DNA Nanodevices, *Proceedings of the Twentieth IEEE International Requirements Engineering Conference* (RE 2012, Chicago, IL, September 24–28, 2012), pp. 211–220.
- [55] Robyn Lutz, Jack Lutz, James Lathrop, Titus Klinge, Eric Henderson, Divita Mathur, and Dalia Abo Sheasha, Engineering and Verifying Requirements for Programmable Self-Assembling Nanomachines, *Proceedings of the Thirty-fourth International Conference on Software Engineering* (ICSE 2012, Zurich, Switzerland, June 2–9, 2012), pp. 1361–1364.

- [54] Xiaoyang Gu, Jack H. Lutz, Satyadev Nandakumar, and James S. Royer, Axiomatizing Resource Bounds for Measure, *Models of Computation in Context: Proceedings of the Seventh Conference on Computability in Europe*, (CiE 2011, Sofia, Bulgaria, June 27–July 2, 2011), Springer, 2011, pp. 102–111.
- [53] James I. Lathrop, Jack H. Lutz, and Brian Patterson, Multi-Resolution Cellular Automata for Real Computation, *Models of Computation in Context: Proceedings of the Seventh Conference on Computability in Europe* (CiE 2011, Sofia, Bulgaria, June 27–July 2, 2011), Springer, 2011, pp. 181–190.
- [52] Jack H. Lutz and Brad Shutters, Approximate Self-Assembly of the Sierpinski Triangle, *Programs, Proofs, Processes: Proceedings of the Sixth Conference on Computability in Europe* (CiE 2010, Ponta Delgada, Portugal, June 30–July 4, 2010), Springer, 2010, pp. 286–295.
- [51] Lance Fortnow, Jack H. Lutz, and Elvira Mayordomo, Inseparability and Strong Hypotheses for Disjoint NP Pairs, *Proceedings of the Twenty-seventh International Symposium on Theoretical Aspects of Computer Science* (STACS 2010, Nancy, France, March 4-6, 2010), Schloss Dagstuhl LZI, 2010, pp. 395–404.
- [50] David S. Doty, Jack H. Lutz, Matthew J. Patitz, Scott M. Summers, and Damien Woods, Intrinsic Universality in Self-Assembly, *Proceedings of the Twenty-Seventh International Symposium on Theoretical Aspects of Computer Science* (STACS 2010, Nancy, France, March 4-6, 2010), Schloss Dagstuhl LZI, 2010, pp. 275–286.
- [49] Xiaoyang Gu, Jack H. Lutz, and Elvira Mayordomo, Curves That Must Be Retraced, *Proceedings of the Sixth International Conference on Computability and Complexity in Analysis* (CCA 2009, Ljubljana, Slovenia, August 18–22, 2009), Schloss Dagstuhl LZI, 2009, pp. 149–160.
- [48] David S. Doty, Jack H. Lutz, Matthew J. Patitz, Scott M. Summers, and Damien Woods, Random Number Selection in Self-Assembly, *Proceedings of the Eighth International Conference on Unconventional Computation* (UC 2009, Ponta Delgada, Portugal, September 7–11, 2009), Springer, 2009, pp. 143–157.
- [47] Jack H. Lutz, A Divergence Formula for Randomness and Dimension, *Mathematical Theory and Computational Practice: Proceedings of the Fifth Conference on Computability in Europe* (CiE 2009, Heidelberg, Germany, July 19–24, 2009), Springer, 2009, pp.342–351. (invited paper)
- [46] Jack H. Lutz and Elvira Mayordomo, Dimensions of Points in Self-Similar Fractals, *Proceedings of the Fourteenth Annual International Computing and Combinatorics Conference* (COCOON 2008, Dalian, China, June 27–29, 2008), Springer, 2008, pp. 215–224.
- [45] James I. Lathrop, Jack H. Lutz, Matthew J. Patitz, and Scott M. Summers, Computability and Complexity in Self-Assembly, *Logic and Theory of Algorithms: Proceedings of the the Fourth Conference on Computability in Europe* (CiE 2008, Athens, Greece, June 15–20, 2008), Springer, 2008, pp.349–358.

- [44] Xiaoyang Gu and Jack H. Lutz, Effective Dimensions and Relative Frequencies, *Logic and Theory of Algorithms: Proceedings of the the Fourth Conference on Computability in Europe* (CiE 2008, Athens, Greece, June 15–20, 2008), Springer, 2008, pp. 231–240.
- [43] Jack H. Lutz and Klaus Weihrauch, Connectivity Properties of Dimension Level Sets, *Proceedings of the Fourth International Conference on Computability and Complexity in Analysis* (CCA 2007, Siena, Italy, June 16-18, 2007), Elsevier, pp. 295–304.
- [42] James I. Lathrop, Jack H. Lutz, and Scott M. Summers, Strict Self-Assembly of Discrete Sierpinski Triangles, *Computation and Logic in the Real World: Proceedings of the Third Conference on Computability in Europe* (CiE 2007, Siena, Italy, June 19–23, 2007), Springer, 2007, pp. 455–464.
- [41] Xiaoyang Gu, Jack H. Lutz, and Elvira Mayordomo, Points on Computable Curves, *Proceedings of the the Forty-seventh Annual IEEE Symposium on Foundations of Computer Science* (FOCS 2006, Berkeley, CA, October 22–24, 2006) IEEE Computer Society Press, 2006, pp. 469–474.
- [40] Xiaoyang Gu and Jack H. Lutz, Dimension Characterizations of Complexity Classes, *Proceedings of the Thirtieth International Symposium on Mathematical Foundations of Computer Science* (MFCS 2006, Bratislava, Slovakia, August 28–September 1, 2006), Springer-Verlag, 2006, pp. 471–479.
- [39] David Doty, Jack H. Lutz, and Satyadev Nandakumar, Finite-State Dimension and Real Arithmetic, *Proceedings of the Thirty-third International Colloquium on Automata, Languages, and Programming* (ICALP 2006, Venice, Italy, July 10–14, 2006), Springer-Verlag, 2006, pp. 537–547.
- [38] Xiaoyang Gu, Jack H. Lutz, and Philippe Moser, Dimensions of Copeland-Erdős Sequences, *Proceedings of the Twenty-fifth Annual Conference on Foundations of Software Technology and Theoretical Computer Science* (FSTTCS 2005, Hyderabad, India, December 15–18,2005), Springer- Verlag, 2005, pp. 250–260.
- [37] David Doty, Xiaoyang Gu, Jack H. Lutz, Elvira Mayordomo, and Philippe Moser, Zeta-Dimension, *Proceedings of the Thirtieth International Symposium on Mathematical Foundations of Computer Science* (MFCS 2005, Gdansk, Poland, August 29– September 2, 2005), Springer-Verlag, 2005, pp. 283–294.
- [36] Krishna B. Athreya, John M. Hitchcock, Jack H. Lutz, and Elvira Mayordomo, Effective Strong Dimension in Algorithmic Information and Computational Complexity, *Proceedings of the Twenty-first Symposium on Theoretical Aspects of Computer Science* (STACS 2004, Montpellier, France, March 25–27, 2004), Springer-Verlag, 2004, pp. 632–643.
- [35] John M. Hitchcock, Jack H. Lutz, and Sebastiaan A. Terwijn, The Arithmetical Complexity of Dimension and Randomness, *Proceedings of the Twelfth Annual Conference of the European Association for Computer Science Logic* (CSL 2003, Vienna, Austria, August 25–30, 2003), Springer-Verlag, 2003, pp. 241–254.

- [34] John M. Hitchcock, Jack H. Lutz, and Elvira Mayordomo, Scaled Dimension and Nonuniform Complexity, *Proceedings of the Thirtieth International Colloquium on Automata, Languages, and Programming* (ICALP 2003, Eindhoven, The Netherlands, June 30–July 4, 2003), Springer-Verlag, 2003, pp. 278–290.
- [33] Lance Fortnow and Jack H. Lutz, Prediction and Dimension, *Proceedings of the Fifteenth Annual Conference on Computational Learning Theory* (COLT 2002, Sydney, Australia, July 8–12, 2002), Springer-Verlag, 2002, pp. 380–395.
- [32] John M. Hitchcock and Jack H. Lutz, Why Computational Complexity Requires Stricter Martingales, *Proceedings of the Twenty-ninth International Colloquium on Automata, Languages, and Programming* (ICALP 2002, Málaga, Spain, July 8–13, 2002), Springer-Verlag, 2002, pp. 549–560.
- [31] Josef M. Breutzmann, David W. Juedes, and Jack H. Lutz, Baire Category and Nowhere Differentiability for Feasible Real Functions, *Proceedings of the Twelfth Annual International Symposium on Algorithms and Computation* (ISAAC 2001, Christchurch, New Zealand, December 19–21, 2001), Springer-Verlag, 2001, pp. 219–230.
- [30] Jack J. Dai, James I. Lathrop, Jack H. Lutz, and Elvira Mayordomo, Finite-State Dimension, *Proceedings of the Twenty-eighth International Colloquium on Automata, Languages, and Programming* (ICALP 2001, Crete, Greece, July 8–12, 2001), Springer-Verlag, 2001, pp. 1028–1039.
- [29] Jack H. Lutz, Gales and the Constructive Dimension of Individual Sequences, *Proceedings of the Twenty-Seventh International Colloquium on Automata, Languages, and Programming* (ICALP 2000, Geneva, Switzerland, July 9–15, 2000), Springer-Verlag, 2000, pp. 902–913.
- [28] Jack H. Lutz, Dimension in Complexity Classes, *Proceedings of the Fifteenth Annual IEEE Conference on Computational Complexity* (CCC 2000, Florence, Italy, July 4–7, 2000), IEEE Computer Society Press, 2000, pp. 158–169.
- [27] Jack H. Lutz, Vikram Mhetre, and Sridhar Srinivasan, Hard Instances of Hard Problems, *Proceedings of the Seventeenth Symposium on Theoretical Aspects of Computer Science* (STACS 2000, Lille, France, February 17–19, 2000), Springer-Verlag, 2000, pp. 324–333.
- [26] Jack H. Lutz and Martin J. Strauss, Bias Invariance of Small Upper Spans, *Proceedings of the Seventeenth Symposium on Theoretical Aspects of Computer Science* (STACS 2000, Lille, France, February 17–19, 2000), Springer-Verlag, 2000, pp. 74–86.
- [25] Jack J. Dai and Jack H. Lutz, Query Order and NP-Completeness, *Proceedings of the Fourteenth Annual IEEE Conference on Computational Complexity* (CCC 1999, Atlanta, GA, May 4–6, 1999), IEEE Computer Society Press, 1999, pp. 142–148.

- [24] David W. Juedes and Jack H. Lutz, Time-Bounded Prefix Kolmogorov Complexity, *Proceedings of the Thirty-sixth Annual Allerton Conference on Communication, Control, and Computing* (Allerton 1998, Monticello, IL, September 23–25, 1998), University of Illinois Press, 1998, pp. 703–712.
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- [22] James I. Lathrop and Jack H. Lutz, Recursive Computational Depth, *Proceedings of the Twenty-fourth International Colloquium on Automata, Languages, and Programming* (ICALP 1997, Bologna, Italy, July 7–11, 1997), Springer-Verlag, 1997, pp. 132–142.
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- [19] Jack H. Lutz, Observations on Measure and Lowness for Δ_2^P , *Proceedings of the Thirteenth Symposium on Theoretical Aspects of Computer Science* (STACS 1996, Grenoble, France, February 22–24, 1996), Springer-Verlag, 1996, pp. 87–97.
- [18] Stephen A. Fenner, Jack H. Lutz, and Elvira Mayordomo, Weakly Useful Sequences, *Proceedings of the Twenty-second International Colloquium on Automata, Languages, and Programming* (ICALP 1995, Szeged, Hungary, July 10–14, 1995), Springer-Verlag, 1995, pp. 393–404.
- [17] Jack H. Lutz, A Small Span Theorem for P/Poly-Turing Reductions, *Proceedings of the Tenth Annual Structure in Complexity Theory Conference* (CCC 1995, Minneapolis, MN, June 19–22, 1995), IEEE Computer Society Press, 1995, pp. 324–330.
- [16] David W. Juedes and Jack H. Lutz, Completeness and Weak Completeness Under Polynomial-Size Circuits, *Proceedings of the Twelfth Symposium on Theoretical Aspects of Computer Science* (STACS 1995, Munich, Germany, March 2–4, 1995), Springer-Verlag, 1995, pp. 26–37.
- [15] Jack H. Lutz, Weakly Hard Problems, *Proceedings of the Ninth Annual Structure in Complexity Theory Conference* (CCC 1994, Amsterdam, The Netherlands, June 28–July 1, 1994), IEEE Computer Society Press, 1994, pp. 146–161.
- [14] Jack H. Lutz and Elvira Mayordomo, Cook versus Karp/Levin: Separating Completeness Notions If NP is Not Small, *Proceedings of the Eleventh Symposium on Theoretical Aspects of Computer Science* (STACS 1994, Caen, France, February 24–26, 1994), Springer-Verlag, 1994, pp. 415–426.

- [13] Ronald V. Book, Jack H. Lutz, and David M. Martin, Jr., The Global Power of Additional Queries to Random Oracles, *Proceedings of the Eleventh Symposium on Theoretical Aspects of Computer Science* (STACS 1994, Caen, France, February 24–26, 1994), Springer-Verlag, 1994, pp. 403–414.
- [12] David W. Juedes and Jack H. Lutz, The Complexity and Distribution of Hard Problems, *Proceedings of the Thirty-fourth IEEE Symposium on Foundations of Computer Science* (FOCS 1993, Palo Alto, CA, November 3–5, 1993), IEEE Computer Society Press, 1993, pp. 177–185.
- [11] David W. Juedes, James I. Lathrop, and Jack H. Lutz, Computational Depth and Reducibility, *Proceedings of the Twentieth International Colloquium on Automata, Languages, and Programming* (ICALP 1993, Lund University, Lund, Sweden, July 5–9, 1993), Springer-Verlag, 1993, pp. 278–288.
- [10] Jack H. Lutz, The Quantitative Structure of Exponential Time, *Proceedings of the Eighth Annual Structure in Complexity Theory Conference* (CCC 1993, San Diego, CA, May 18–21, 1993), IEEE Computer Society Press, 1993, pp. 158–175. (invited paper)
- [9] Jack H. Lutz and Elvira Mayordomo, Measure, Stochasticity, and the Density of Hard Languages, *Proceedings of the Tenth Symposium on Theoretical Aspects of Computer Science* (STACS 1993, Würzburg, Germany, February 25–27, 1993), Springer-Verlag, 1993, pp. 38–47.
- [8] Ronald V. Book and Jack H. Lutz, On Languages With Very High Information Content, *Proceedings of the Seventh Annual Structure in Complexity Theory Conference* (CCC 1992, Boston University, Boston, MA, June 22–25, 1992), IEEE Computer Society Press, 1992, pp. 255–259.
- [7] Ronald V. Book, Jack H. Lutz, and Klaus Wagner, On Complexity Classes and Algorithmically Random Languages, *Proceedings of the Ninth Symposium on Theoretical Aspects of Computer Science* (STACS 1992, Paris, France, February 13–15, 1992), Springer-Verlag, 1992, pp. 319–328.
- [6] Jack H. Lutz, A Pseudorandom Oracle Characterization of BPP, *Proceedings of the Sixth Annual Structure in Complexity Theory Conference* (CCC 1991, University of Chicago, Chicago, IL, June 30–July 3, 1991), IEEE Computer Society Press, 1991, pp. 190–195.
- [5] Ronald V. Book, Jack H. Lutz, and Shouwen Tang, Additional Queries to Random and Pseudorandom Oracles, *Proceedings of the Seventeenth International Colloquium on Automata, Languages, and Programming* (ICALP 1990, University of Warwick, Coventry, UK, July 16–20, 1990), Springer-Verlag, 1990, pp. 283–293.
- [4] Jack H. Lutz and William J. Schmidt, Circuit Size Relative to Pseudorandom Oracles, *Proceedings of the Fifth Annual Structure in Complexity Theory Conference* (CCC

1990, Universitat Politècnica de Catalunya, Barcelona, Spain, July 8–11, 1990), IEEE Computer Society Press, 1990, pp. 268–286.

- [3] Jack H. Lutz, Almost Everywhere High Nonuniform Complexity, *Proceedings of the Fourth Annual Structure in Complexity Theory Conference* (CCC 1989, University of Oregon, Eugene, OR, June 19–22, 1989), IEEE Computer Society Press, 1989, pp. 37–53.
- [2] Jack H. Lutz, Pseudorandom Sources for BPP, *Proceedings of the Third Annual Structure in Complexity Theory Conference* (CCC 1988, Georgetown University, Washington, D.C., June 14–17, 1988), IEEE Computer Society Press, 1988, pp. 175–180.
- [1] Jack H. Lutz, Resource-Bounded Baire Category and Small Circuits in Exponential Space, *Proceedings of the Second Annual Structure in Complexity Theory Conference* (CCC 1987, Cornell University, Ithaca, NY, June 16–19, 1987), IEEE Computer Society Press, 1987, pp. 81–91.

Invited columns

- [2] John M. Hitchcock, Jack H. Lutz, and Elvira Mayordomo, The Fractal Geometry of Complexity Classes, in the Complexity Theory Column (L. A. Hemaspaandra, ed.), *SIGACT News* **36:3** (September, 2005), pp. 24–38.
- [1] Jack H. Lutz and Elvira Mayordomo, Twelve Problems in Resource-Bounded Measure, in the Computational Complexity Column (E. Allender, ed.), *Bulletin of the European Association for Theoretical Computer Science* **68** (1999), pp. 64–80.

Papers under review

- [1] Jack H. Lutz and Neil Lutz, Lines Missing Every Random Point, submitted to *Computability*.

Invited lectures at conferences

- [14] “TBD,” Tenth Conference on Computability, Complexity, and Randomness (CCR 2015), University of Heidelberg, Heidelberg, Germany, June 22–26, 2015.
- [13] “Lines and Points, Randomness and Dimension,” AMS-ASL Special Session on Logic and Probability, Joint Mathematics Meetings, Baltimore, MD, January 15–18, 2014.
- [12] “Finite-State Dimensions,” Eleventh International Conference on Unconventional Computation and Natural Computing (UCNC 2012), Orleans, France, September 3–7, 2012. (plenary lecture)
- [11] “Alan Turing in the Twenty-first Century: Normal Numbers, Randomness, and Finite Automata,” Seventh Conference on Computability, Complexity, and Randomness (CCR 2012), University of Cambridge, Cambridge, UK, July 2–6, 2012.

- [10] “The Dimensions of Individual Points in Euclidean Space,” Logic, Dynamics, and Their Interactions, with a celebration of the work of Dan Mauldin, University of North Texas, Denton, TX, June 4–8, 2012.
- [9] “The Computer Science of DNA Nanotechnology,” Sixth International Conference on Language and Automata Theory and Applications (LATA 2012), A Coruna, Spain, March 5-9, 2012. (plenary lecture)
- [8] “The Computer Science of Molecular Programming,” Seventeenth International Conference on DNA Computing and Molecular Programming (DNA 17), California Institute of Technology, Pasadena, CA, September 19–23, 2011. (plenary lecture)
- [7] “Computability and Complexity in Geometric Measure Theory,” AMS-ASL Special Session on Logic and Analysis, Joint Mathematics Meetings, New Orleans, LA, January 6–9, 2011.
- [6] “Polynomial-Time Dimension and Randomness,” Fifth Conference on Logic, Computability, and Randomness, University of Notre Dame, Notre Dame, IN, May 24–28, 2010.
- [5] “A Divergence Formula for Randomness and Dimension”, Special Session on Algorithmic Randomness, Computability in Europe 2009: Mathematical Theory and Computational Practice, University of Heidelberg, Heidelberg, Germany, July 19–24, 2009.
- [4] “Dimension Spectra of Random Fractals,” Fourth Conference on Logic, Computability, and Randomness, International Center for Mathematical Meetings, Luminy, France, June 30–July 3, 2009.
- [3] “The Dimension of a Point: Computability Meets Fractal Geometry”, Special Session on Complexity, Computability in Europe 2005: New Computational Paradigms, University of Amsterdam, Amsterdam, The Netherlands, June 8–12, 2005.
- [2] “Effective Fractal Dimensions”, International Conference on Computability and Complexity in Analysis, Cincinnati, OH, August 28–30, 2003.
- [1] “The Quantitative Structure of Exponential Time”, Eighth Annual IEEE Structure in Complexity Theory Conference, San Diego, CA, May 18–21, 1993.

Invited tutorials at conferences

- [4] “Effective Fractal Dimensions,” Computability in Europe 2011: Models of Computation in Context, Sofia, Bulgaria, June 27–July 2, 2011. (three hours)
- [3] “Kolmogorov Complexity, Information, and Randomness,” Annual Meeting of the Association for Symbolic Logic, Chicago, IL, June 1–4, 2003. (three hours)
- [2] “Kolmogorov Complexity and its Applications,” Fourth International Colloquium on Grammatical Inference, Ames, IA, July 12–14, 1998. (two hours)

- [1] “Resource-Bounded Measure,” Logic Colloquium ’96: European Summer Meeting of the Association for Symbolic Logic, San Sebastian, Spain, July 9–15, 1996. (three hours)

Invited panels at conferences

- [1] “Hard Problems in DNA Computing and Molecular Programming,” (with Anne Condon, Vincent Danos, and John Reif), Seventeenth International Conference on DNA Computing and Molecular Programming (DNA 17), California Institute of Technology, Pasadena, CA, September 19–23, 2011.

Lectures at workshops, invitational seminars, etc.

- [24] “Parametrizing Self-Assembly,” Workshop: Natural Algorithms and the Sciences, Princeton, NJ, May 20–21, 2013. (invited lecture)
- [23] “Dimensions of Individual Points in Self-Similar Fractals and their Random Subfractals,” Workshop on Fractals and Tilings, Strobl, Austria, July 6–10, 2009. (invited lecture)
- [22] “A Divergence Formula for Randomness and Dimension,” International Workshop on the Complexity of Simple Programs, University College Cork, Cork, Ireland, December 6–7, 2008. (invited lecture)
- [21] “Dimensions of Points in Self-Similar Fractals”, Seminar on Algebraic Methods in Computational Complexity, International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, October 7–12, 2007.
- [20] “Dimensions of Points in Self-Similar Fractals”, Third International Conference on Computability and Complexity in Analysis, Gainesville, Florida, November 1-5, 2006.
- [19] “Dimensions of Individual Points in Euclidean Space”, ARCC Workshop on Effective Randomness, American Institute of Mathematics, Palo Alto, CA, August 7–11, 2006. (invited lecture)
- [18] “Dimensions of Copeland-Erdős Sequences”, Special Session on Randomness in Computation, Fall Central Section Meeting of the American Mathematical Society, University of Nebraska, Lincoln, NE, October 21-23, 2005. (invited lecture)
- [17] “Effective Fractal Dimensions”, Sixth Annual Regional Workshop in the Mathematical Sciences, University of Nebraska, Lincoln, NE, November 7–8, 2003. (invited plenary lecture)
- [16] “The Robustness of Kolmogorov Complexity as an Information Measure,” Seminar on Kolmogorov Complexity and Applications (on the occasion of the 100th anniversary of Andrei N. Kolmogorov’s birthday), International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, April 27–May 2, 2003.

- [15] “Randomness and Dimension,” Workshop on Computability and Randomness, University of Heidelberg, Heidelberg, Germany, April 25–26, 2003.
- [14] “Effective Fractal Dimension,” Seminar on Algebraic Methods in Quantum and Classical Models of Computation, International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, October 13–18, 2002.
- [13] “The Fractal Geometry of Complexity Classes,” Workshop on Computational Complexity and Statistical Physics, Santa Fe, NM, September 4–6, 2001.
- [12] “Resource-Bounded Measure,” Meeting on Logic, Computability, and Complexity, National Research Institute for Mathematics and Computer Science (CWI), Amsterdam, The Netherlands, March 5–7, 1998. (invited talk)
- [11] “Genericity and Randomness over Feasible Probability Measures,” Workshop on Languages, Algorithms, and Complexity (Celebrating the Sixtieth Birthday of Professor Ronald V. Book), University of Minnesota, Minneapolis, MN, April 12, 1997. (invited talk)
- [10] “Equivalence of Measures of Complexity Classes,” Seminar on Structure and Complexity, International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, September 30–October 4, 1996.
- [9] “Equivalence of Measures of Complexity Classes,” Workshop on Information and Randomness in Complexity Classes, International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, July 15–19, 1996.
- [8] “Observations on Measure and Lowness for Δ_2^P ,” American Mathematical Society Annual Meeting for the Southeastern Section, Special Session on Complexity Theory, Greensboro, NC, November 17–18, 1995. (invited talk)
- [7] “Feasible Martingales, Weak Completeness, and Strong Hypotheses,” Seminar on Structure and Complexity, International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, February 14–18, 1994.
- [6] “The Utility and Depth of Information,” Seminar on Descriptive Complexity, International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, May 3–7, 1993. (invited talk)
- [5] “The Structure of Exponential Time,” Workshop on Structurally Related Complexity Theory, Fourth European Summer School on Logic, Language, and Information, University of Essex, Colchester, UK, August 17–28, 1992. (invited talk)
- [4] “Measure (and Category) in Complexity Classes,” Workshop on Structurally Related Complexity Theory, Fourth European Summer School on Logic, Language, and Information, University of Essex, Colchester, UK, August 17–28, 1992. (invited talk)
- [3] “Intrinsically Pseudorandom Sequences,” DIMACS Workshop on Structural Complexity and Cryptography, Rutgers University, Piscataway, NJ, December 3–6, 1990.

- [2] “A Pseudorandom Oracle Characterization of BPP,” Workshop in Structural Complexity Theory, University of California, Santa Barbara, CA, March 30–31, 1990. (invited talk)
- [1] “Measure-Theoretic Pseudorandomness: Robustness of the Notion,” 1990 AAAI Spring Symposium on Theory and Applications of Minimal-Length Encoding, Stanford University, Stanford, CA, March 27–29, 1990.

Workshop papers, posters, and abstracts

- [6] The Computer Science of DNA Nanotechnology, abstract of invited lecture in Adrian Horia Dediu, Carlos Martin-Vide (eds.), *Language and Automata Theory and Applications: Proceedings of the Sixth International Conference (LATA 2012, A Coruna, Spain, March 5-9, 2012)*, Springer 2012, p. 57.
- [5] The Computer Science of Molecular Programming, abstract of invited plenary lecture in Luca Cardelli and William Shih (eds.), *DNA Computing and Molecular Programming: 17th International Conference, DNA 17, Pasadena, CA, USA, September, 2011, Proceedings*, Springer, 2011, p. 21.
- [4] Intrinsic Universality in Self-Assembly (with David S. Doty, Matthew J. Patitz, Scott M. Summers, and Damien Woods), Poster presented at the Molecular Programming Project Second Annual Workshop, California Institute of Technology, Pasadena, CA, January 8–10, 2010.
- [3] Axiomatizing Resource Bounds for Measure (with Xiaoyang Gu, Satyadev Nandakumar, and James S. Royer), Talk at the Tenth International Workshop on Logic and Computational Complexity (Los Angeles, CA, August 10, 2009).
- [2] Random Number Selection in Self-Assembly (with David S. Doty, Matthew J. Patitz, Scott M. Summers, and Damien Woods), Poster presentation and extended abstract in *Proceedings of the Sixth Annual Conference on Foundations of Nanoscience: Self-Assembled Architectures and Devices* (Snowbird, UT, April 20–24, 2009), ScienceTechnica, 2009, to appear.
- [1] The Dimension of a Point: Computability Meets Fractal Geometry, abstract of invited special session lecture in *New Computational Paradigms: Proceedings of the First Conference on Computability in Europe*, (Amsterdam, The Netherlands, June 8–12, 2005), Springer, 2005, p. 299.

Recent lectures at universities

- [30] “Mutual Dimension,” Logic Seminar, Department of Mathematics, California Institute of Technology, April 2, 2014.
- [29] “Mutual Dimension,” Computer Science Colloquium, University of Minnesota, Minneapolis, MN, February 4, 2013.

- [28] “The Dimensions of Individual Points in Euclidean Space,” Logic Seminar, Department of Mathematics, George Washington University, Washington, DC, October 15, 2012.
- [27] “Two visions from Turing: Universality and the power of constraining resources,” SAS Seminar, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, Cambridge, UK, March 13, 2012.
- [26] “The Dimensions of Individual Points in Euclidean Space,” Graduate Seminar, Department of Mathematics and Statistics, University of Missouri–Kansas City, Kansas City, MO, November 9, 2011.
- [25] “The Dimensions of Individual Points in Euclidean Space,” Mathematics Colloquium, Lamar University, Beaumont, TX, March 1, 2011.
- [24] “The Dimensions of Individual Points in Euclidean Space,” Mathematics Colloquium, Pennsylvania State University, State College, PA, February 17, 2011.
- [23] “Molecular Programming and Self-Assembly,” Computer Science and Engineering Colloquium, Pennsylvania State University, State College, PA, February 16, 2011.
- [22] “Computable Curves,” Logic Seminar, Pennsylvania State University, State College, PA, February 15, 2011.
- [21] “The Dimensions of Individual Points in Euclidean Space,” UCLA Logic Colloquium, University of California at Los Angeles, Los Angeles, CA, January 21, 2011.
- [20] “Molecular Programming and Self-Assembly,” Computer Science Seminar Series, Simpson College, Indianola, IA, October 15, 2010.
- [19] “Inseparability and Strong Hypotheses for Disjoint NP Pairs,” Southern Wisconsin Logic Colloquium, University of Wisconsin, Madison, WI, March 24, 2009.
- [18] “Inseparability and Strong Hypotheses for Disjoint NP Pairs,” Logic Seminar, University of North Texas, Denton, TX, February 18, 2009.
- [17] “Computational Aspects of Nanoscale Self-Assembly,” Computer Science and Engineering Colloquium, University of South Carolina, Columbia, SC, February 10, 2009.
- [16] “A Divergence Formula for Randomness and Dimension,” Tech Talk, Microsoft Research, Redmond, WA, November 13, 2008.
- [15] “Computability and Complexity in Nanoscale Self-Assembly,” Complexity Seminar, University of Maryland, College Park, MD, March 5, 2008.
- [14] “Strict Self-Assembly of Discrete Sierpinski Triangles,” Computer Science Seminar, University of Zaragoza, Zaragoza, Spain, March 7, 2007.
- [13] “Strict Self-Assembly of Discrete Sierpinski Triangles,” Algorithms, Bioinformatics, Complexity and Formal Methods Seminar, Polytechnic University of Catalonia, Barcelona, Spain, March 1, 2007.

- [12] “The Dimensions of Individual Points in Euclidean Space,” Logic Seminar, University of Chicago, Chicago, IL, October 20, 2006.
- [11] “The Dimensions of Individual Points in Euclidean Space,” Complexity Seminar, University of Maryland, College Park, MD, October 18, 2006.
- [10] “New Dimensions in the Theory of Computing”, Southern Wisconsin Logic Colloquium, University of Wisconsin, Madison, WI, May 11, 2006.
- [9] “New Dimensions in the Theory of Computing”, Computer Science Seminar, University of Zaragoza, Zaragoza, Spain, April 7, 2006.
- [8] “Effective Dimensions and Information”, Theoretical Computer Science Seminar, University of Würzburg, Würzburg, Germany, March 2, 2005.
- [7] “Effective Dimensions and Information”, Theoretical Computer Science Seminar, University of Ulm, Ulm, Germany, February 28, 2005.
- [6] “Effective Dimensions and Information”, Mathematics Colloquium, Florida International University, Miami, FL, February 16, 2005.
- [5] “Effective Fractal Dimensions,” Computer Science Colloquium, University of Wyoming, Laramie, WY, April 6, 2004.
- [4] “Effective Fractal Dimensions,” Mathematics Colloquium, Iowa State University, Ames, IA, December 9, 2003.
- [3] “Randomness and Dimension,” Theoretical Computer Science Seminar, Fern University, Hagen, Germany, July 15, 2003.
- [2] “Randomness and Dimension,” Theory of Computing Seminar, University of Wisconsin, Madison, WI, May 8, 2003.
- [1] “Randomness and Dimension,” Computer Science Colloquium, University of Chicago, Chicago, IL, May 7, 2003.

Teaching

Courses taught at Iowa State University:

Undergraduate:

Computer Science 330 (Discrete Computational Structures) Spring 1988 (two sections), Fall 1988, Spring 1989, Fall 1989, Spring 1990, Fall 1991, Spring 1992, Fall 1992, Spring 1993, Fall 1993, Spring 1994, Spring 1995, Spring 1996, Fall 1998, Spring 2000, Spring 2005

Computer Science 331 (Theory of Computing) Spring 1995, Fall 1995, Fall 1999, Spring 2002, Fall 2002, Fall 2003, Spring 2004, Spring 2005, Spring 2007, Fall 2009, Spring 2010, Fall 2010, Fall 2011, Fall 2012, Fall 2013, Fall 2014

Computer Science 433 (same as Computer Science 533, listed below) Fall 2006, Fall 2007, Spring 2009, Spring 2011, Spring 2015

Graduate:

Computer Science 531 (Theory of Computation) Fall 1987, Fall 1988, Fall 1992, Spring 1997, Spring 2002, Spring 2008, Spring 2011

Computer Science 532 (Theoretical Foundations) Spring 1991

Computer Science 533 (Computational Models of Nanoscale Self-Assembly) Fall 2006, Fall 2007, Spring 2009, Spring 2011, Spring 2015

Computer Science 631 (Computational Complexity) Fall 1989, Fall 1991, Fall 1994, Spring 1997, Fall 1998, Fall 2000, Fall 2004, Fall 2008, Fall 2013, Fall 2014

Computer Science 633 (Randomness in Computation) Spring 1994, Spring 1996, Spring 1998, Spring 2000, Fall 2001, Fall 2003, Fall 2005, Fall 2009, Fall 2012

Served as mentor for Freshman Honors Program (University Studies 290H) Spring 1988, Spring 1992, Spring 1997, Spring 1998, Spring 2014

Conducted special seminar on Molecular Programming (Com S 490 for undergraduates; Com S 610 for graduates) Spring 2013

Taught special topics course (Computer Science 490/590: Nanocomplexity: The Theory of Computing Meets the Foundations of Nanoscience), Spring 2005

Taught special topics course (Computer Science 490/590: Information, Program Size, Data Compression, and Forecasting) Fall 1993

Supervised Undergraduate Honors Project of Nyle Sutton (Computer Science and Mathematics), 2014–2015

Supervised Undergraduate Honors Project of Tyson Williams (Computer Engineering), 2009

Supervised Undergraduate Thesis of Aubrey DaCunha (Mathematics), 2004

Served as mentor for Ph.D. student Facundo Bromberg in Preparing Future Faculty program, Fall 2003

Supervised senior Honors Project of Brad J. Behle, 2000–2001

Co-conducted (with Pavan Aduri, Timothy H. McNicholl, and Derrick Stolee) Information and Complexity Seminar (Computer Science 610) Summer 2014

Co-conducted (with Pavan Aduri) Information and Complexity Seminar (Computer Science 610) Fall 2002, Fall 2003, Spring 2004, Fall 2004, Fall 2006, Spring 2007, Spring 2008, Fall, 2008, Spring 2009, Spring 2010, Fall 2010

Conducted Information and Complexity Seminar (Computer Science 610) Fall 1987, Spring 1988, Summer 1988, Fall 1988, Spring 1989, Summer 1989, Spring 1990, Spring 1991, Summer 1991, Fall 1991, Spring 1992, Fall 1992, Spring 1993, Spring 1994, Fall 1994, Spring 1995, Fall 1995, Spring 1996, Spring 1997, Spring 1998, Fall 1998, Spring 1999, Fall 1999, Spring 2000

Ph.D. degrees supervised and completed at Iowa State University:

- [11] Brian Patterson (Ph.D., Computer Science, 2011: “Three Topics in the Theory of Computing: Multi-Resolution Cellular Automata, the Kolmogorov Complexity Characterization of Regular Languages, and Hidden Variables in Bayesian Networks,” supervised jointly with James I. Lathrop), Assistant Professor, Division of Mathematics and Computer Science, Oglethorpe University, Atlanta, GA.
- [10] Scott M. Summers (Ph.D., Computer Science, 2010: “Universality in Algorithmic Self-Assembly,” supervised jointly with James I. Lathrop), Assistant Professor, Department of Computer Science and Software Engineering, University of Wisconsin–Platteville, Platteville, WI.
- [9] Matthew J. Patitz (Ph.D., Computer Science, 2010: “Toward a Molecular Programming Language for Algorithmic Self-Assembly”), Assistant Professor, Department of Computer Science and Computer Engineering, University of Arkansas, Fayetteville, AR.
- [8] Xiaoyang Gu (Ph.D., Computer Science, 2009: “Fractals in Complexity and Geometry”), Principal Software Engineer, LinkedIn, Mountain View, CA.
- [7] Satyadev Nandakumar (Ph.D., Computer Science, 2009: “Dynamics, Measure and Dimension in the Theory of Computing”), Assistant Professor, Department of Computer Science and Engineering, Indian Institute of Technology, Kanpur, India.
- [6] David S. Doty (Ph.D., Computer Science, 2009: “Applications of the Theory of Computation to Nanoscale Self-Assembly,” supervised jointly with James I. Lathrop), Computing Innovation Fellow and Postdoctoral Scholar, Department of Computing and Mathematical Sciences, California Institute of Technology, Pasadena, CA.
- [5] John M. Hitchcock (Ph.D., Computer Science, 2003: “Effective Fractal Dimension: Foundations and Applications”), Associate Professor, Department of Computer Science, University of Wyoming, Laramie, WY. Honorable mention (one of two) for the 2004 Zaffarano Award for Graduate Student Research (awarded to one Iowa State University graduate student each year).
- [4] Jack J. Dai (Ph.D., Mathematics, 2001: “Some Results in Probability and Theoretical Computer Science,” supervised jointly with Krishna B. Athreya), Postdoctoral Research Fellow, Department of Mathematics, Fudan University, Shanghai, China. Winner of the 2001 Zaffarano Award for Graduate Student Research (awarded to one Iowa State University graduate student each year).
- [3] James I. Lathrop (Ph.D., Computer Science, 1997: “Computing and Evolving Variants of Computational Depth”), Senior Lecturer, Department of Computer Science, Iowa State University, Ames, IA.
- [2] Josef M. Breutzmann (Ph.D., Computer Science, 1996: “The Complexity of Parameters for Probabilistic and Quantum Computation”), Professor and Chair, Department of Mathematics, Computer Science, and Physics, Wartburg College, Waverly, IA.

- [1] David W. Juedes (Ph.D., Computer Science, 1994: “The Complexity and Distribution of Computationally Useful Problems”), Associate Professor and Chair, School of Electrical Engineering and Computer Science, Ohio University, Athens, Ohio.

M.S. degrees supervised and completed at Iowa State University:

- [15] Scott M. Summers (M.S., 2007: “Strict Self-Assembly of Discrete Sierpinski Triangles”), continued for Ph.D., listed above.
- [14] Mallika Bachan (M.S., 2005: “Finite-State Dimension of the Kolakoski Sequence”), Software Engineer, Citrix Systems, Inc., Santa Barbara, CA.
- [13] Jared Nichols (M.S., 2004: “Pushdown Gamblers and Pushdown Dimension”), Software Engineer, ProVation Medical, Minneapolis, MN.
- [12] Anumodh Abey (M.S., 2004: “A Correspondence Principle for Finite-State Dimension”), Software Engineer, Cingular Wireless, Atlanta, GA.
- [11] John M. Hitchcock (M.S., 2001: “Resource-Bounded Dimension, Nonuniform Complexity, and Approximation of MAX3SAT”), continued for Ph.D., listed above.
- [10] Sridhar Srinivasan (M.S., 2000: “Average-Case Complexity and Instance Complexity”), Ph.D. student, Georgia Institute of Technology, Atlanta, GA.
- [9] Vikram Mhetre (M.S., 1999: “Instance Complexities of Hard and Weakly Hard Problems”), Software Engineer, Motorola Corporation, Schaumburg, IL.
- [8] Borislav Simov (M.S., 1995: “Tests for Poly-Random Collections”), completed Ph.D. in computer science with two other advisors at Iowa State University in 2003.
- [7] Yong Zhao (M.S., 1995: “ (α, β) -Randomness and Computational Depth”), Software Engineer, Nationwide Insurance, Columbus, OH.
- [6] James I. Lathrop (M.S., 1994: “Compression Depth and the Behavior of Cellular Automata”), continued for Ph.D., listed above.
- [5] J. Andrew Edwards (M.S., 1993: “Pseudorandom Generators and Structural Complexity”), Controller, Edwards Printing, Des Moines, IA.
- [4] Owen Reynolds (M.S., 1993: “Relative to a Random Oracle, co-NP Is Not Contained in IP/Poly”), Lecturer, Department of Computer Science, Iowa State University, Ames, IA.
- [3] William J. Schmidt (M.S., 1991: “Circuit Size Relative to Pseudorandom Oracles”). Completed Ph.D. in computer science with another advisor at Iowa State University in 1992. Development Staff Member, IBM, Rochester, MN.
- [2] David W. Juedes (M.S., 1990: “Hard and Weakly Hard Problems Under Nonuniform Reductions”), continued for Ph.D., listed above.

- [1] Robert Matthews (M.S., 1989: “Iterative Computation of Rapidly Growing Functions”), Completed Ph.D. in computer science with another advisor at College of William and Mary in 2004. Assistant Professor of Computer Science, Truman State University, Kirksville, MO.

External memberships on Ph.D. committees at other universities:

- [6] Maria Lopez-Valdes (Ph.D., Computer Science, 2011: “Aplicaciones de la Dimension Efectiva a la Complejidad Computacional y a los Algoritmos de Compresion de Datos”, University of Zaragoza, Zaragoza, Spain, with advisor Elvira Mayordomo), CEO, Bit-Brain Technologies, Zaragoza, Spain.
- [5] Sung-il Pae (Ph.D., Computer Science, 2005: “Random Number Generation Using a Biased Source”, University of Illinois, Urbana-Champaign, IL, with advisor Michael C. Loui), Assistant Professor of Computer Science, Hongik University, Seoul, Korea.
- [4] Sebastiaan A. Terwijn (Ph.D., Mathematics, 1998: “Computability and Measure,” University of Amsterdam, Amsterdam, The Netherlands, with advisors Klaus Ambos-Spies and Leen Torenvliet), Assistant Professor of Mathematics, Radboud University Nijmegen, Nijmegen, The Netherlands.
- [3] Yongge Wang (Ph.D., Mathematics, 1996: “Randomness and Complexity,” University of Heidelberg, Heidelberg, Germany, with advisor Klaus Ambos-Spies), Associate Professor of Software and Information Systems, University of North Carolina at Charlotte, Charlotte, NC.
- [2] Martin J. Strauss (Ph.D., Mathematics, 1995: “Measure in Feasible Complexity Classes,” Rutgers University, New Brunswick, NJ, with advisor Eric Allender), Professor, Department of Electrical Engineering and Computer Science and Department of Mathematics, University of Michigan, Ann Arbor, MI.
- [1] Elvira Mayordomo (Ph.D., Computer Science, 1994: “Contributions to the Study of Resource-Bounded Measure,” Universitat Politècnica de Catalunya, Barcelona, Spain, with advisor Jose Balcazar), Professor of Computer Science, University of Zaragoza, Zaragoza, Spain.

Graduate students currently supervised at Iowa State University:

- Adam Case (Ph.D., Kolmogorov Complexity, Effective Fractal Dimensions, and Computable and Complexity in Analysis), completion expected May, 2015.
- Xiang Huang (Ph.D., Verification in Molecular Programming and DNA Nanotechnology), completion expected May, 2016.
- Titus Klinge (Ph.D., Molecular Programming and DNA Nanotechnology, supervised jointly with James I. Lathrop), completion expected May, 2015.
- Divita Mathur (Ph.D., Molecular Programming and DNA Nanotechnology, supervised jointly with Eric R. Henderson), completion expected May, 2015.

Donald Stull (Ph.D., Computational Complexity and Molecular Programming), completion expected May, 2016.

Supervised the research of Sebastiaan A. Terwijn, a Ph.D. student at the University of Amsterdam, during his four-month stay at Iowa State University (August, 1995 - November, 1995) on a Fulbright Scholarship.

Awards

Excellence in Research Award, College of Liberal Arts and Sciences, Iowa State University, 2007

Presidential Young Investigator, National Science Foundation, 1991

Excellence in Teaching Award, Iowa State University, 1990

Bohnenblust Travel Prize, Caltech, 1983

Florence Black Teaching Award, University of Kansas, 1978

Memberships

Association for Computing Machinery

Special Interest Group on Algorithms and Computation Theory

Special Interest Group on Logic and Computation

European Association for Theoretical Computer Science

International Society for Nanoscale Science, Computation, and Engineering

Association for Symbolic Logic

American Mathematical Society

Mathematical Association of America

Society for Industrial and Applied Mathematics

Refereeing

SIAM Journal on Computing

Information and Computation

Theoretical Computer Science

ACM Transactions on Computational Logic

Theory of Computing Systems

Journal of Symbolic Logic

Journal of Computer and System Sciences

Information Processing Letters

Journal of Complexity

Mathematical Logic Quarterly

American Mathematical Monthly

IEICE Transactions on Information and Systems

IEEE Symposium on Foundations of Computer Science

IEEE Conference on Computational Complexity

International Colloquium on Automata, Languages, and Programming

Symposium on Theoretical Aspects of Computer Science

International Symposium on Mathematical Foundations of Computer Science

National Science Foundation

Idaho Specific Research Grant Program
International Science Foundation Long-Term Research Grants

Other external service

- Member of Program Committee, Eleventh Conference on Computability in Europe (CiE 2015, Bucharest, Romania, June 29–July 3, 2015).
- Member of Program Committee, Eighth International Conference on Language and Automata Theory and Applications (LATA 2014, Madrid, Spain).
- Organizer (with Timothy McNicholl) of Special Session on Computability and Complexity in Discrete and Continuous Worlds, Spring Central Section Meeting, American Mathematical Society, Ames, IA, April 27–28, 2013.
- Member of Program Committee, Seventh International Conference on Language and Automata Theory and Applications (LATA 2013, Bilbao, Spain).
- Member of Program Committee, Ninth International Conference on Computability and Complexity in Analysis (CCA 2012, Cambridge, UK).
- Organizer (with Rod Downey) of Special Session on Cryptography, Complexity, and Randomness, Turing Centenary Conference: Eighth Conference on Computability in Europe (CiE 2012, Cambridge, UK).
- Member of Program Committee, Seventeenth Annual Computing and Combinatorics Conference (COCOON 2011, Dallas, TX).
- Ad hoc reviewer, NSF CAREER Awards.
- Member of Program Committee, Fifth Conference on Logic, Computability and Randomness (CCR 2010, Notre Dame, IN).
- Member of Scientific Program Committee, Fifth International Conference on Computability and Complexity in Analysis (CCA 2008, Hagen, Germany).
- Member of Program Committee, Third Conference on Computability, Complexity, and Randomness (CCR 2008, Nanjing, China).
- Member of Program Committee, Twenty-Second IEEE Conference on Computational Complexity (CCC 2007, San Diego, CA).
- Member of Scientific Program Committee, Second International Conference on Computability and Complexity in Analysis (CCA 2005, Kyoto, Japan).
- Organizer (with Pavan Aduri and Vinodchandran N. Variyam) of the Atlantic Theory Seminar, a joint Iowa State University – University of Nebraska seminar on computational complexity, algorithmic information, and learning that meets several times each year in Atlantic, IA. (First met in March, 2003.)
- Member of Review Panel, National Science Foundation.
- Member of Conference Committee, IEEE Conference on Computational Complexity (CCC), 2000–2002.
- Member of Review Panel, National Science Foundation.
- Member of Program Committee, Fourteenth Symposium on Theoretical Aspects of Computer Science (STACS 1998, Paris, France).
- Member of Review Panel, National Science Foundation.
- Organizer (with Klaus Ambos-Spies and Ronald V. Book) of Workshop on Information and Randomness in Complexity Classes, International Conference and Research Center for Computer Science, Schloss Dagstuhl, Germany, July 15–19, 1996.

Member of Program Committee, Eleventh IEEE Conference on Computational Complexity (CCC 1996, Philadelphia, PA).

Member of Committee of Visitors for oversight review of Theory of Computing Program, National Science Foundation, 1993.

Member of Program Committee, Eighth IEEE Structure in Complexity Theory Conference (CCC 1993, San Diego, CA).

Internal service

Computer Science Department Faculty Mentoring Committee, 2014–2015; Chair 2014–2015
Computer Science Department Faculty and Staff Recognition and Awards Committee, 2014–2015

Computer Science Department Teaching Evaluation Committee, 1997–1999, 2003–2005, 2014–2015; Chair 2010–2011

Computer Science Department Promotion and Tenure Steering Committee, 1996–1997, 1999–2000, 2000–2001, 2002–2003, 2006–2007, 2008–2009, 2010–2011, 2013–2014; Chair 1999–2000, 2000–2001, 2002–2003, 2006–2007, 2010–2011, 2013–2014

Faculty mentor for Derrick Stolee, 2013–2014

Mathematics Department Individual Review Team for Promotion and Tenure, 2013–2014.

Computer Science Department Scholarship and Awards Committee, 2003–2004, 2013–2014; Chair, 2003–2004

Chair of Joint Computer Science–Statistics Faculty Search Committee for Cluster Hire in Big Data Analytics, 2012–2013.

Faculty mentor for Timothy H. McNicholl, 2012–2013

Computer Science Department Faculty Search Committee, 1990–1991, 1995–1996, 1996–1997, 2000–2001, 2002–2003, 2007–2008, 2009–2010; Chair 2007–2008, 2009–2010

Computer Science Department Graduate Committee, 1988–1998, 2001–2002, 2007–2008, 2009–2010, 2010–2011; Chair 1996–1998

Computer Science Department Ad Hoc Committee to Introduce a Bachelor of Arts Degree, Spring 2008, 2010–2011.

Computer Science Department Faculty Advisory Committee for Review of Department Executive Officer, Spring 2007

Computer Science Department Graduate Admissions Committee, 2001–2003, 2004–2005, 2006–2007; Chair 2002–2003, 2004–2005, 2006–2007

Computer Science Department Teaching Evaluation Committee, 1997–1999, 2003–2005; Chair 2010–2011

Faculty mentor for Ting Zhang, 2008–2009

Computer Science Department Faculty Advisory Committee for Review of Department Executive Officer, Fall 2004

Member of Review Panel for Carver Trust Grants

Computer Science Department Grievance Committee, 2002–2004, 2006–2007; Chair, 2003–2004, 2006–2007

Computer Science Department Ad Hoc Committee on Governance, 1989–1990, 2002–2003

Faculty mentor for Pavan Aduri, 2001–2002

Computer Science Department Executive Officer Search Committee, 2000–2001

Member of Review Panel for Carver Trust Grants

Computer Science Department Director of Graduate Education, 1998–2000
Liberal Arts and Sciences Research/Scholarship Advisory Committee, 1999–2000
Liberal Arts and Sciences Dean Search Committee, Fall 1998
Fourth Annual Faculty Conference, Grinnell, IA, March 22–23, 1996
Computer Science Department Ad Hoc Committee on Long Range Strategic Planning, 1994–1995
Computer Science Department Ad Hoc Committee on Outcomes Assessment, 1991–1992, 1994–1995
Computer Science Department Ad Hoc Committee on Collaborative Efforts in Software Engineering, 1994–1995
Computer Science Department Faculty Advisory Committee for Review of Department Executive Officer, Fall 1994
Computer Science Department Ad Hoc Committee on 25th Anniversary, 1993–1994
Science and Humanities Ad Hoc Committee on ‘White Paper’ for High School Mathematics Requirements, Fall 1988
Computer Science Department Undergraduate Committee, 1987–1988