CURRICULUM VITAE
August 19, 2024

Notarization. I have read the following and certify that this *curriculum vitae* is a current and accurate statement of my professional record.

Signature: William Gasarch.   Date: December 17, 2021.

I Personal Information

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Univ. of Maryland
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Current Academic Appointment: Full Professor.

Other Academic and/or Administrative Appointments while at UMD

1. UMIACS: 1985–2010

2. Spring 2015-present: Math Affiliate.

Employment Background

1. 1981-85 Teaching Assistant, Comp. Sci. Dept., Harvard Univ.

2. 1981-85 Research Assistant, Comp. Sci. Dept., Harvard Univ.

3. 1985-1991 Assistant Professor, Comp. Sci. Dept., Univ. of Maryland.

4. 1991- Associate Professor, Comp. Sci. Dept, Univ. of Maryland.

5. 1985-2010 Univ. of Maryland Institute for Adv. Comp. Studies (UMIACS).

6. 1988- Member of Applied Math Program.

7. 1991-1992 Sabbatical. Visited several Universities (list available).

8. 1998- Full Professor, Comp. Sci. Dept., Univ of Maryland.

9. Fall 1998-Spring 1999. Full Year Sabbatical. Visited several Universities (list available).

10. Fall 2005. Half year Sabbatical. Visited several Universities (list available).

11. Fall 2015-Spring 2016. Full year Sabbatical. Visited several Universities (list available).

Educational Background

1. BA in Math and Applied Math, SUNY at Stonybrook, Spring 1980.

2. MS in Applied Math, Harvard University, Spring 1982.

3. Ph.D in Computer Science, Harvard University, Spring 1985. Adviser: Harry Lewis. Title of Thesis: *Recursion-theoretic techniques in complexity theory and combinatorics.*

II Research, Scholarly and Creative Activities

Books

Books Authored

1. Bounded Queries in Recursion Theory (with Georgia Martin). Birkhauser. 1998. ISBN: 0917639667.

2. Problems in Algorithms (with Ian Parberry). 2002. A Web book, hence no ISBN. Web address: `http://ianparberry.com/books/free/poa.pdf`

3. Problems with a Point: Exploring Mathematics and Computer Science (with Clyde Kruskal). 2018. World Scientific.

4. Mathematical Muffin Morsels: Nobody wants a small piece (with Erik Metz, Jacob Prinz, Daniel Smolyak) 2019. World Scientific.

5. Computational Intractability: A Guide to Algorithmic Lower bounds (with Erik Demaine and MohammadTaghi Hajiaghayi). To appear in 2025. MIT Press.

Book Chapters

1. Oracles: Three New Results. *Marcel Dekker Lecture Notes in Pure and Applied Mathematics Vol. 106*, Edited by D.W. Kueker, E.G.K. Lopez-Escobar, and C.H. Smith, 1987, pp. 219-252. ISBN: 0824777468.

2. Index Sets in Recursive Combinatorics (with G. Martin), *Logical Methods (In honor of Anil Nerode's Sixtieth Birthday)*. Edited by Crossley, Remmel, Shore, and Sweedler. 1993. Edited by Birkhauser, Boston. ISBN: 0817636900

3. The Complexity of Problems, *Advances in Computers Volume 43*. Edited by Marvin Zelkowitz. Published by Academic Press. Pages 215–241. 1996. ISBN: 978-0-12-012143-4

4. A Survey of Inductive Inference with an Emphasis on Learning via Queries (with C. Smith). *Complexity, Logic, and Recursion Theory*. Edited by A. Sorbi. Published by M. Dekker. Pages 225–260. Volume 187. 1997. ISBN: 08247-0026-0.

5. A Survey of Recursive Combinatorics. *Handbook of Recursive Mathematics Volume 2*. Edited by Ershov, Goncharov, Marek, Nerode, and Remmel. 1998. Pages 1041–1176. Published by Elsevier ISBN: 0444544249

6. A techniques-oriented survey of bounded queries. (with Frank Stephan). *Models and Computability (invited papers from Logic Colloquium '97)* (Lecture Note Series 259), Edited by Cooper and Truss. 117-156, 1999. London Mathematical Society Forschungsberichte Mathematische Logik 32 / 1998, Mathematisches Institut, Universitaet Heidelberg, Heidelberg, 1998. ISBN: 0521635500

7. Computability, *Handbook of Discrete and Combinatorial Mathematics*. Edited by Kenneth Rosen. Published by CRC Press (Boca Raton, Florida). 2000. pp. 1062-1066. ISBN: 8131219569

8. A Survey of Constant Time Parallel Sorting, for *Bulletin of the European Association for Theoretical Computer Science (BEATCS)* (with Evan Golub and Clyde Kruskal), Vol 72, pages 84-102, October 2000, Computational Complexity Column.

9. Gems in the field of bounded queries. *Computability and Models* Edited by Cooper and Goncharov. 2003. ISBN: 03064700X

10. A Survey on Private Information Retrieval *Bulletin of the European Association for Theoretical Computer Science (BEATCS)* Vol 82, February 2004, pages 72–107. Computational Complexity Column.

11. Classifying Problems Into Complexity Classes. *Advances in Computers Volume 95*. Edited by Atif Memon Published by Elsevier. Pages 239–292. 2014. ISBN 978-0-12-800160-8

12. Proving Programs Terminate using Well Orderings, Ramsey Theory, and Matrices. *Advances in Computers Volume 97*. Edited by Atif Memon. Published by Elsevier. Pages 147–200. 2015. ISBN 978-0-12-802133-0

13. Low, superlow, and superduperlow sets. *Landscapes in Logic: Contemporary Logic and Computing (Vol 1)*. Edited by Adrian Rezus. Published by College Publications. Pages 542–553. 2020.

14. Small NFA's for cofinite unary languages Co-authored with Eric Metz, Eric Shen, Zan Xu, Sam Zbarsky). *Landscapes in Logic (Vol I)*. Edited by Andrian Rezus. Published by College Publications. Pages 554–573. 2020.

Articles in Refereed Journals

1. Relativizations Comparing NP and Exponential Time (with S. Homer), *Information and Control*, Vol. 58, July 1983, pp. 88–100.

2. Oracles for Deterministic vs. Alternating Classes, *SIAM Journal of Computing*, Vol. 16, Aug 1987, pp. 613–627.

3. Polynomial Terse Sets (with A. Amir), *Information and Computation*, Vol. 77, No. 1, 1988, pp. 37–56. (Conference version appeared in *Conference on Structure in Complexity Theory*, 1987)

4. Nondeterministic Bounded Query Reducibilities (with R. Beigel, and J. Owings), *Annals of Pure and Applied Logic*, Vol. 41, 1989, pp. 107-118.

5. Training Sequences (with D. Angluin and C. Smith), *Theoretical Computer Science*, Vol. 66, 1989, pp. 255-272.

6. On the Complexity of Finding the Chromatic Number of a Recursive Graph I: The Bounded Case (with R. Beigel), *Annals of Pure and Applied Logic*, Vol. 45, 1989, pp. 1-38.

7. On the Complexity of Finding the Chromatic Number of a Recursive Graph II: The Unbounded Case (with R. Beigel), *Annals of Pure and Applied Logic*, Vol. 45, 1989, pp. 227-247.

8. Bounded Query Classes and the Difference Hierarchy (with R. Beigel and L. Hay), *Archive for Math. Logic*, Vol. 29, 1989, pp. 69-84.

9. The Mapmaker's Dilemma (with R. Beigel), *Discrete Applied Math (Special Issue on Theoretical Computer Science)*, Vol. 34, 1991, pp. 37-48. (Conference version in *Capital City Conference on Combinatorics and Theoretical Computer Science, 1989*)

10. On Selecting the k Largest with Restricted Quadratic Queries, *Information Processing Letters*, Vol. 38, 1991, pp. 193-195.

11. Learning via Queries to $[+, <]$ (with M. Pleszkoch and R. Solovay), *Journal of Symbolic Logic*, Vol. 57, 1992, pp. 53-81. (Conference version in *Computational Learning Theory (COLT)*, 1990)

12. Learning Programs with an Easy to Calculate Set of Errors (with Rameshkumar Sitarman, C. Smith, and Mahendran Velauthapillai), *Fundamentica Informaticae*, Vol. 16, No. 3-4, pp. 355–370, 1992. (Conference version in *Conference on Computational Learning Theory (COLT)* 1988.)

13. Learning via Queries (with C. Smith), *Journal of the Association of Computing Machinery*, Vol. 39, 1992, pp. 649-675. (Conference versions in *Foundations of Computer Science (FOCS) 1988* and *Conference on Computational Learning Theory (COLT)* 1988)

14. Selection Problems using m-ary queries (with K. Guimaraes and J. Purtilo), *Computational Complexity*, Vol. 2, 1992, pp. 256-276.

15. Terse, Superterse, and Verbose Sets (with R. Beigel, J. Gill, and J. Owings), *Information and Computation*, Vol. 103, 1993, pp. 68-85, 1993.

16. On Checking Versus Evaluation of Multiple Queries (with Lane Hemachandra and Albrech Hoene), *Information and Computation*, Vol. 105, 1993, pp. 72–93. (Conference version in *Mathematical Foundations of Computer Science (MFCS) 1990*)

17. Extremes in the Degrees of Inferability (with L. Fortnow, S. Jain, E. Kinber, M. Kummer, S. Kurtz, M. Pleszkoch, T. Slaman, F. Stephan, R. Solovay), *Annals of Pure and Applied Logic*, Vol. 66, 1994, pp. 231-276. (Subsumes the conference papers *Learning via queries to an Oracle* and *Degrees of Inferability*).

18. On Honest Polynomial Reductions and P=NP (with R. Downey, and M. Moses), *Annals of Pure and Applied Logic*, Vol. 70, 1994, pp. 1-27. (Conference version appeared in *Conference on Structure in Complexity Theory*, 1989.

19. Learning via Queries with Teams and Anomalies (with E. Kinber, M. Pleszkoch, C. Smith, and T. Zeugmann), *Fundamenta Informaticae*, Vol. 23, Number 1, May 1995, pp. 67-89.

20. Recursion theoretic models of learning: some results and intuitions, (with C. Smith) *Annals of Mathematics and Artificial Intelligence*, Vol. 15, II, 1995, pp. 155-166.

21. OptP-Completeness as the Normal Behavior of NP-Complete Problems (with M. Krentel and K. Rappoport), *Math Systems Theory*, Vol. 28, 1995, 487-514

22. Frequency Computation and Bounded Queries (with R. Beigel and E. Kinber) *Theoretical Computer Science*, Vol. 163, 1996, 177-192. (Conference version *Conferences on Computational Complexity Theory (CCC) 1995*)

23. Bounded Queries and Approximation (with R. Chang and C. Lund), *SIAM Journal of Computing*, Vol. 26, 1997, 188-209 (Conference version in *Foundations of Computer Science (FOCS)* 1993.)

24. Binary search and recursive graph problems (with K. Guimaraes) *Theoretical Computer Science* Vol 181, 1997, 119-139. Special issue for LATIN 95 conference. (Conference version in LATIN 1995).

25. Asking Questions Versus Verifiability (with M. Velauthapillai), *Fundamenta Informaticae* Vol. 30, 1-9, 1997 (Conference version in *Analogical and Inductive Inference (AII)* 1992)

26. Addition in $\log n + O(1)$ Steps on Average: A Simple Analysis (with R. Beigel, M. Li, L. Zhang), *Theoretical Computer Science.* Vol 191, 1998, 245–248.

27. Relative Sizes of Learnable Sets (with L. Fortnow, R. Freivalds, M. Kummer, S. Kurtz, C. Smith, and F. Stephan), *Theoretical Computer Science* Vol 197(1-2):139-156, 1998.

28. Recursion theory and Reverse Mathematics (with Jeffery Hirst). *Mathematical Logic Quarterly.* Vol. 44, 1998, 465-473.

29. On the Finiteness of the Recursive Chromatic Number (with A. Lee). *Annals of Pure and Applied Logic* Vol. 93, 73-81, 1998.

30. Classification via Information (with M. Plezskoch, M. Velauthapillai, and F. Stephan), *Annals of Mathematics and Artificial Intelligence.* Vol. 23, 147–168, 1998.

31. On the Number of Automorphisms of a Graph (with R. Beals, R. Chang and J. Toran), *Chicago Journal of Theoretical Computer Science* February 1999. (Conference version in *Tenth Annual Conferences on Structure in Complexity Theory*,)

32. When can one load a set of dice so that the sum is uniformly distributed? (with C. Kruskal) *Mathematics Magazine*. Vol. 72, No. 2, 1999, pp 133-138.

33. The Complexity of ODD_n^A (with R. Beigel, M. Kummer, G. Martin, T. McNichol, and F. Stephan) *Journal of Symbolic Logic*, Vol. 65, 1–18, 2000. (Subsumes the conference paper *The query complexity of sets* from *Mathematical Foundations of Computer Science (MFCS) 1996*.

34. The Communication Complexity of Enumeration, Elimination, and Selection (with Andris Ambainis, Harry Buhrman, Bala Kalyanasundaram, Leen Torenvliet) *Journal of Computer and Systems Science* (Special issue for *Conference on Computational Complexity* 2000). Vol 63, pages 148-185, 2001.

35. Automata Techniques for Query Inference Machines (with G. Hird), *Annals of Pure and Applied Logic* Vol. 117, 2002, pp 171-202.

36. Max and min limiters (with James Owings and Georgia Martin), *Archives of Mathematical Logic* Vol. 41, 2002, pp 483-495.

37. Constant Time Parallel Sorting: An Empirical View (with E. Golub and C. Kruskal) *Journal of Computer and Systems Science* Vol 67, 2003, pages 63-91.

38. When Does a Random Robin Hood Win? (with E. Golub and A. Srinivasan) *Theoretical Computer Science* Vol 304, 2003, pages 477–484.

39. Some connections between bounded query classes and non-uniform complexity (with A. Amir and R. Beigel), *Information and Computation* Vol 186, 2003, 104-139. (Conference version in *Conference on Computational Complexity (CCC)* 19

40. A Nearly Tight Lower Bound for Restricted Private Information Retrieval Protocols (with Richard Beigel and Lance Fortnow), *Computational Complexity*. Vol 15, No 1, 2006, 82–91.

41. Inferring Answers from Questions (with Andrew Lee) *Journal of Computer and Systems Sciences*. Volume 74, No 4, 2008, 490-512. (Conference version in *Conference on Computational Learning theory COLT)* 1997).

42. Finding Large 3-free sets I: The small n case. (with James Glenn and Clyde Kruskal), *Journal of Computer and Systems Science* Volume 74, No 4, 2008, 628-655.

43. The Complexity of Finding SUBSEQ(A). (with Steven Fenner and Brian Postow). *Theory of Computing Systems* Volume 45, No. 3, 2009, pages 577-612.

44. The Complexity of Learning SUBSEQ(A). (with Steven Fenner and Brian Postow). *Journal of Symbolic Logic* Volume 74, No 3, 2009, pages 939-975. (Conference version in *Algorithmic Learning Theorem (ALT) 2006*)

45. A Survey of Lower Bounds on the van der Waerden Numbers $W(k, 2)$: Randomized-Constructive and Deterministic-Constructive (with Bernhard Haeupler). *Electronic Journal of Combinatorics* Volume 18, No. P64, 2011.

46. Limits on the computational power of random strings (with E. Allender and L. Friedman). *Information and Computation* Special issue for ICALP 2011. Volume 222, 2013, Pages 80–92.

47. Lower bounds on the Deterministic and Quantum Communication Complexity of Hamming-Distance Problems (with Andris Ambainis, Aravind Srinivasan, Andrey Utis). *ACM Transactions of Complexity Theory*. Volume 7, No 3, July 2015, Article 10.

48. Distinct volume subsets (with David Conlon, Jacob Fox, David Harris, Douglas Ulrich, Samuel Zbarsky). at *SIAM Journal of Discrete Mathematics*. Vol. 29, No. 1, 472–480, 2015.

49. On the sizes of DPDAs, PDAs, and LBAs (with Richard Beigel). *Theoretical Computer Science*. Vol 638, No. 25, 2016, pages 63-75.

50. Hilbert's proof of his Irreducibility Theorem (with Ken Regan and Mark Villarino) *American Mathematics Monthly* Vol 125, No. 6, 2018, pages 513–530.

51. The Coefficient-Choosing Game (with Larry Washington and Sam Zbarsky). *Journal of Combinatorics and Number Theory* Vol 10, No. 1, 2018. Page 1–19.

52. Distinct volume subsets via indiscenribles (with Douglas Ulrich). *Archives of Mathematical Logic*. Vol 58, 2018, Pages 469–483. `https://doi.org/10.1007/s00153-018-0646-z`

53. The complexity of grid coloring (with Daniel Apon and Kevin Lawler). *Theory of Computing Systems*. Vol 67, pages 521-547, June, 2023. `https://doi.org/10.1007/s00224-022-10098-5`

54. From Schur's theorem and FLT ($n = 4$) you can derive that the number of primes is infinite. *Discrete Mathematics*. Vol 346, No. 11, November 2023. 113336. `https://doi.org/10.1016/j.disc.2023.113336`

Other Professional Publications

1. Finding the ith largest of n for small i,n, (with W. Kelly and B. Pugh) *SIGACT NEWS*, Vol 27, No. 2, 1996.

2. Complexity Theory Newsflash (with L. Fortnow and S. Fenner), *SIGACT NEWS*, Vol 27, No. 3, 1996.

3. Squares in a Square: On-line questions. (with A. Ambainis) Geocombinatorics, Volume X, No. 1, 2000.

4. Problem 1659, December 2002, Mathematics Magazine.

5. A Survey of Constant Time Parallel Sorting, for *Bulletin of the European Association for Theoretical Computer Science* (with Evan Golub and Clyde Kruskal), Vol 72, pages 84-102, October 2000, Computational Complexity Column.

6. The P=?NP Poll *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 33, 2002.

7. A Survey on Private Information Retrieval *Bulletin of the European Association for Theoretical Computer Science* Vol 82, February 2004, pages 72–107. Computational Complexity Column.

8. The P=?NP Poll- 10 years later. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 43, 2012. Column Edited by Lane Hemaspaandra.

9. Open problems about grid coloring and the complexity of grid coloring. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 47, No. 3, 2016.

10. Wanted: A communication complexity proof of lower bounds on PARITY. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 48, No. 3, 2017.

11. Different ways to prove a language not regular. (with Daniel Frishberg). *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 49, N1. 3, 2018.

12. P vs NP: Invitation to a Poll. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 49, No. 2, 2018.

13. The Muffin Problem (with Scott Huddleston, Erik Metz, Jacob Prinz). *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 49, No 4, 2018. Column Edited by Lane Hemaspaandra.

14. The Third P=?NP Poll. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 50, No 1, 2019. Column Edited by Lane Hemaspaandra.

15. My answers to my my P vs NP poll. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 50, No 1, 2019.

16. A Number-sequence problem inspired by an Oliver Roeder Column. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 50, No. 4, 2019.

17. The testtaker-testmaker dilemma. (with Bajaj) *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 51, No. 1, 2019.

18. A known problem in Ramsey Theory: Ramsey Multiplicity. *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 51, No. 2, 2020.

19. When Ramsey Theory Fails Settle for More Colors (with Natasha Dobrinen). *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 51, No. 4, 2020.

20. Generalizing the 3SUM Problem (with Erik Metz). *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 52, No. 1, 2020.

21. Hilbert's Tenth Problem for Fixed d and n. *Bulletin of the European Association for Theoretical Computer Science (EATCS)*, Vol 133, February 2021.

22. Complexity of $\chi(G)$ restricted to bounded crossing number or genus (with Hayes, Ostuni, Park). *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 53, No. 2, 2022.

23. An intriguing sequence (with Kapliz and Metz). *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 53, No. 3, 2022.

24. Open problems by or inspired by Juris Hartmanis (with Allender, Cai, Fortnow, Immerman, Kurtz, Royer, Williams). *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 53, No. 4, 2022.

25. Permutable and Compatible Primes (with Gezalyan and Patrick), *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 54, No. 3, 2023.

26. Pennies on a Chessboard, *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 54, No. 4, 2023.

27. Revisiting Three Open Problems Columns, *Special Interest Group in Algorithms and Computing Theory (SIGACT)* Vol 55, No. 4, 2024.

Book Reviews, Notes, and Other Contributions

Book Reviews
Over 100. List available on request.

Conferences and Workshops: Talks, Abstracts, and Other Contributions

Refereed Presentation

1. Bounded Queries in Recursive Graph Theory and Complexity Theory. Association of Symbolic Logic Spring Meeting, March 1988, Michigan State Univ.

2. Some Open problems in Concrete Complexity, *Workshop on Structural Complexity*, Dagstuhl, Germany, Feb. 1992.

3. Frequency Computation and Bounded Queries, *Workshop on Structural Complexity*, Dagstuhl, Germany, Feb. 1994.

4. The Complexity of Finding the Obstruction Set *Association of Symbolic Logic*, Orlando Florida, Jan 1996.

5. Inductive Inference and Recursion Theory. European Meeting on Complexity, Logic, and Recursion theory. Barcelona, Spain. March 1996.

6. Bounded Queries in Recursion Theory: A Historical Survey. Association of Symbolic Logic. Leeds, England. 1997

7. Bounded queries in recursion theory, Learning via Queries, Concrete Complexity (9 lectures). University of Sienna (Italy). Oct 1998.

8. Gems of Bounded Queries. Computable Model Theory Conference. Germany, 2001.

9. What is an Explicit Construction?, October 2009 Dagstuhl Workshop on Complexity Theory

10. What is an Explicit Construction?, October 2009 Italian Workshop on Ramsey Theory and Logic.

11. Sane Bounds on Some Polynomial VDW numbers, DIMACS Workshop on Ramsey Theory, May 2009.

12. Grid Coloring, DIMACS workshop on Ramsey Theory, May 2009.

13. Sane Bounds on Some Polynomial VDW numbers, October 2009. Italian Workshop on Ramsey Theory and Logic, October 2009.

14. An NP-Complete problem in Grid Coloring Dagstuhl Workshop on Complexity Theory, October 2012.

15. Inserting Cryptography into Discrete Math Courses. August 2013. Intel Conference on Security Education.

16. NIM with Cash, Dagstuhl Workshop on Complexity Theory, October 2014.

17. A sane reduction from 3-COL to k-COL. Dagstuhl Workshop on Complexity Theory, October 2014.

18. On SAT Solvers and Ramsey-type Numbers (with Burcu Canakci, Hannah Christenson, Robert Fleishman, Nicole McNabb, Daniel Smolyak). AMS regional meeting in Rutgers, October 2015.

19. Three results on making change (an exposition) (with Naveen Raman) AMS regional meeting in Rutgers, October 2015.

20. Rectangle Free colorings of grids. Gathering for Gardner, May 2016.

21. Wagering in Final Jeopardy (with Jessica Abramson and Natalie Collina) Regional AMS conference in Buffalo, Fall 2017

22. The Muffin Problem (with Guang Cui, Naveen Durvasula, John Dickerson, Erik Metz, Jacob Prinz, Naveen Raman, Daniel Smolyak, Sunny Yoo). Invited talk at AMS regional conference in San Diego Winter 2018.

23. The Muffin Problem (see above for co-authors). Gathering for Gardner, April 2018.

24. (Z, Succ, U), (Z, E, U), and thei CSP's (with Michael Lastowski and Shaopeng Zhu). theory and application of models of computation (TAMC)

25. The Big Ramsey Degree of Countable Ordinals (with Joanna Boyland, Nathan Hurtig, Robert Rust). Joint Math Meeting (AMS and MAA), January 2023.

Non-refereed Presentations

1. Clock versus Vacation Schedules (with Yoni Levy), *Operations Research Society of America* May 1985.

2. Recursive Categoricity of Highly Recursive Rooted Graphs (with D. Mount and D. Kueker) *Nineteenth Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Baton Rouge, February 1988 Also in *Congressus Numerantium*, Vol. 69, pp. 97-102, 1989.

3. Comparisons Between Complexity-Theoretic and Recursion-Theoretic Graph Theory (with R. Beigel and Mike Lockwood) *Third Carbondale Combinatorics Conference* October 1988.

4. The Mapmaker's Dilemma (with R. Beigel) *Capital City Conference on Combinatorics and Theoretical Computer Science*, George Washington Univ. (In Washington DC), May 1989.

5. Recursion Theoretic Models of Learning: Some Results and Intuitions, (with C. Smith) *International Symposium on Artificial Intelligence and Mathematics*, Ft. Lauderdale, Florida, January 1990.

6. Recursive Edge Colorings of Recursive Graphs (with Gary Benson and Terry Grant), *Twenty-First Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, February 1990

7. A Survey of Recursive Combinatorics, *A Symposium in Honor of Anil Nerode's Sixtieth Birthday*, Cornell, June 1992

8. Reverse mathematics and recursive graph theory, (with Jeff Hirst), *Annual meeting of the Association of Symbolic Logic*, March 1994.

9. Implementing Weak Second Order Theory of Natural Numbers via Finite Automata (with James Glenn), *Workshop on Implementing Automata*, August 1996.

10. Implementing WS1S via Finite Automata: Performance Issues. (with James Glenn), *Workshop on Implementing Automata*, September 1997.

11. On the order of Queries (with Richard Beigel, Richard Chang, Jacob Lurie, and Timothy McNicoll) *AMS meeting, October 1997.*

12. Finding the same number twice. (with Alexander Chan and Clyde Kruskal). *Thirtieth Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, February 1999

13. The search for an honest man. (with Adam Bargteil). *Thirtieth Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, February 1999

14. Nonconstructive is BETTER for sorting. (with Evan Golub and Clyde Kruskal). *Thirtieth Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, February 1999

15. Knights and Knormals (with Adam Bartgeil). *Thirty first Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, March 2000.

16. Constructive techniques in Ramsey Theory (with Kevin Kane). *Thirty first Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, March 2000.

17. Interesting Colorings of the Plane (with Clyde Kruskal). *Thirty first Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, March 2000.

18. Squares in a square: an online problem (with Andris Ambainis). *Thirty first Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, March 2000.

19. The Egg Game (with Stuart Fletcher). *Thirty fifth Southeastern International Conference on Combinatorics, Graph Theory, and Computing* Boca Raton, Florida, March 2004.

20. Monochromatic rectangles in grid colorings (with Guang Cui, Kaan Dokmeci, Sung Yoo), *Forty Eighth Southeastern International Conference on Combinatorics, Graph Theory, and Computing.* Boca Raton, Florida, March 2017.

21. To click, plick, point, card or survey in class? (with Evan Golub and Jason Filippou), *23rd Annual Innovations in Teaching and Learning Conference.* Poster Session, University of Maryland, College Park, May 2017

Refereed Conference Proceedings

1. On the inference of sequences of functions, *International Workshop on Analogical and Inductive Inference*, (with C. Smith), Wendisch–Rietz, DDR, October 1986. (Lecture Notes in Computer Science 265, pp. 23-41)

2. Polynomial Terse Sets (with A. Amir), *Second Annual Conference on Structure in Complexity Theory*, Cornell, June 1987. (Journal version in *Information and Computation*)

3. Learning Via Queries (with C. Smith) *Conference on Computational Learning Theory* August 1988.

4. Learning via Queries (with C. Smith) *29th Annual IEEE Symposium on the Foundations of Computer Science* October 1988. (Journal version in *Journal of the Association of Computing Machinery (JACM)*.

5. Learning Programs with an Easy to Calculate Set of Errors (with Rameshkumar Sitarman, C. Smith, and Mahendran Velauthapillai) *Conference on Computational Learning Theory, August 1988* (Also presented at *International Workshop on Analogical and Inductive Inference*. Journal version in *Fundamentica Informaticae*)

6. On Honest Polynomial Reductions, Relativizations, and P=NP (with R. Downey, S. Homer, and M. Moses), *Fourth Annual Conference on Structure in Complexity Theory*, Univ. of Oregon, June 1989. (Journal version in *Annals of Pure and Applied Mathematics*)

7. Learning via Queries to an Oracle (with M. Pleszkoch), *Second Annual Conference on Computational Learning Theory* August 1989. (Subsumed in the journal paper *Extremes in the degrees of Inferability* which appeared in *Annals of Pure and applied Logic.*)

8. Some connections between bounded query classes and non-uniform complexity (with A. Amir and R. Beigel), *Fifth Annual Conference on Structure in Complexity Theory*, Barcelona, Spain, June 1990. (Journal version in *Information and Computation*)

9. On Checking Versus Evaluation of Multiple Queries (with Lane Hemachandra and Albrech Hoene), *15th International Symposium on Mathematical Foundations of Computer Science (MFCS '90)*, Banska Bystrica, Czechoslovakia August 1990. (Journal version in *Information and Computation*)

10. Learning via Queries to $[+, <]$ (with M. Pleszkoch and R. Solovay), *Third Annual Conference on Computational Learning Theory* August 1990. (Journal version in *Journal of Symbolic Logic*)

11. Learning via Queries with Teams and Anomalies (with E. Kinber, M. Pleszkoch, C. Smith, and T. Zeugmann), *Third Annual Conference on Computational Learning Theory* August 1990.

12. A Survey of Bounded Queries in Recursion Theory, *Sixth Annual Conferences on Structure in Complexity Theory*, Chicago, June 1991.

13. On the number of components of a recursive graph (with K. Guimaraes), *First Latin American Symposium on Theoretical INformatics (LATIN 92)* April 1992. Lecture notes in Computer Science volume 583, 177-190. (Journal version in *Theoretical Computer Science* Special issue of the best papers from LATIN.)

    Degrees of Inferability (with P. Cholak, R. Downey, L. Fortnow, E. Kinber, M. Kummer, S. Kurtz, and T. Slaman), *Fifth Annual Conference on Computational Learning Theory* July 1992. (Subsumed in the journal paper *Extremes in the degrees of Inferability* which appeared in *Annals of Pure and applied Logic.*)

14. Asking Questions Versus Verifiability *International Workshop on Analogical and Inductive Inference (AII)*, (with M. Velauthapillai), October 1992. (Lecture notes in Artificial Intelligence 642, pp. 197-213)

15. Bounded Queries and Approximation (with R. Chang), *34th Annual IEEE Symposium on the Foundations of Computer Science* October 1993. (Journal version in *SIAM Journal of Computing.*)

16. Classification Using Information *Algorithmic Learning Theory* (with M. Pleszkoch and Mahendran Velauthapillai), Germany, October 1994. (Lecture notes in Artificial Intelligence 961, pp. 165-176)

17. Measure, Category, and Learning Theory *International Conference on Automata, Languages, and Programming* (ICALP). July 1995. (with Fortnow, Freivalds, Kummer, Kurtz, Smith, and Stephan)

18. Frequency Computation and Bounded Queries (with R. Beigel and E. Kinber), *Tenth Annual Conferences on Structure in Complexity Theory*, June 1995. (Journal version in *Theoretical Computer Science*.)

19. On the Number of Automorphisms of a Graph, (with R. Chang and J. Toran), *Tenth Annual Conferences on Structure in Complexity Theory*, June 1995. (Journal version in *Chicago Journal of Theoretical Computer Science*)

20. Reductions in Learning Via Queries (with G. Hird) *Eighth Conference on Computational Learning Theory* July 1995. (Journal version, different title: Automata Techniques for Query Inference Machines in *Annals of Pure and Applied Logic* Vol. 117, 2002, pp 171-202.)

21. Unbounded search and recursive graphs (with K. Guimaraes), *Fourth annual Latin American Symposium on Theoretical INformatics (LATIN 95)* Lecture Notes in Computer Science, 911, pp. 323-331, 1995. (Journal version in *Theoretical Computer Science* Special issue for the best papers in LATIN 1995.)

22. On the query complexity of sets (with R. Beigel, M. Kummer, G. Martin, T. McNichol, and F. Stephan) *21st International Symposium on Mathematical Foundations of Computer Science (MFCS '96)*, Cracow, Poland August 1996. (Subsumed in Journal paper *The complexity of ODD_n^A* in *Journal of Symbolic Logic*.)

23. Inferring answers from data (with Andrew Lee) *Tenth Annual Conference on Computational Learning theory* July 1997. (Journal version in *Journal of Computer and Systems Sciences*).

24. FIN Teams and games *Algorithmic Learning Theory (ALT)* (A. Ambainis, K. Apsitis, R. Freivalds, W. Gasarch and C. Smith), *Eighth International Workshop on Algorithmic Learning Theory*, Sendi, Japan, October 1997, in *Springer Verlag Lecture Notes in Artificial Intelligence*, Vol. 1316, pp. 2–17.

25. The Communication Complexity of Enumeration, Elimination, and Selection (with Andris Ambainis, Harry Buhrman, Bala Kalyanasundaram, Leen Torenvliet) *Fifteenth Annual Conferences on Structure in Complexity Theory*, July 2000. (Journal version in *Journal of Computer and Systems Science*.)

26. AHA: An illuminating Perspective. (with Dan Garcia and David Ginat). *Thirty third annual SIGCSE Technical symposium on Computer Science Education*, Feb 2002.

27. The Multiparty Communication Complexity of Exact-T revisited. (with Richard Beigel and James Glenn). *Thirty First International Symposium on Mathematical Foundations of Computer Science (MFCS)* August 2006.

28. The Complexity of Learning SUBSEQ(A). (with Steven Fenner) *Seventeenth International Workshop on Algorithmic Learning Theory (ALT)*, September 2006. (Journal version in *Journal of Symbolic Logic*).

29. Lower bounds on the Deterministic and Quantum Communication Complexity of HAM_n^a. (with A. Ambainis, A. Srinivasan, A. Utis) *Proceedings of 17th International Symposium on Algorithms and Computation (ISAAC)* December 2006.

30. Limits on the computational power of random strings (with E. Allender and L. Friedman) *International Conference on Automata, Languages, and Programming* (ICALP). July 2011. (Journal version in *Information and Computation* Special Issue for best papers in ICALP 2011.)

31. Applications of the Erdos-Rado Canonical Ramsey Theorem to Erdos-Type problems. (with Sam Zbarsky). Conference for Paul Erdos's 100th Birthday. (Appeared in *Electronic notes in discrete mathematics* Vol 43, Sept 2013, pages 305-310.)

32. A Muffin-Theorem Generator. (with Guang Cui, Naveen Durvasula, John Dickerson, Erik Metz, Jacob Prinz, Naveen Raman, Daniel Smolyak, Sunny Yoo) FUN with Algorithms 2018. `https://drops.dagstuhl.de/opus/volltexte/2018/8806/pdf/LIPIcs-FUN-2018-15.pdf`

33. (Z, Succ, U), (Z, E, U), and their CSP's (with Michael Lastowski and Shaopeng Zhu). Theory and application of models of computation (TAMC) 2023. `https://link.springer.com/chapter/10.1007/978-3-031-20350-3_14`

Completed Creative Works

A play which got into a play-writing contest: *Sure he created the Universe, but would he get Tenure?* 2000.

Sponsored Research

Grants

1. 1988-1990 NSF Research Grant to study *Bounded Queries in Complexity Theory*, jointly with A. Amir. Grant number: CCR-880-3641. Amount: $134,000.

2. 1990 NSF Research Experience for Undergraduates award jointly with A. Amir. To study decision tree complexity. Add to Grant CCR-880-3641, Amount: $4000.

3. 1991-1993 NSF Research Grant to study *Inductive Inference and other topics in Foundations of Computing.* Jointly with C. Smith. Grant Number CCR 9020079. Amount: $173,400.

4. 1991-1995 Capitol Area Theory Seminar, (with C. Smith) NSF $6000. CCR 9112976.

5. 1994-1997 Learning, Complexity, and Testing, (with C. Smith) NSF $211,260. 1994-1997. CCR 9301339.

6. 1994 NSF Supplement to Learning, Complexity, and Testing for undergrad research. $5000.

7. 1994-1997 Capitol Area Theory Seminar, (with S. Khuller) NSF $7500. CCR 9401842.

8. 1996 NSF Supplement to Learning, Complexity, and Testing for undergrad research. $5000.

9. 1997 NSF Supplement to Learning, Complexity, and Testing for undergrad research. $5000.

10. 1997-1999 The capabilities and Limitations of Automated Discovery (with C. Smith) NSF $180,000.

11. 2001-2003 A Computational Theory of Discovery (with C. Smith) NSF 210,000. CCR-01-05413.

12. 2003 NSF Supplement to Computational Theory of Discovery, for undergrad research. $5000.

13. 2005 Request by STAND (Science and Technology: Addressing the Need for Diversity) to Intel to Pilot CS SPIRAL(Summer Project in Research and Learning). Faculty Director. (with Clyde Kruskal, Larry Davis, Joelle Carter). $40,000

14. 2013-2015 NSF Research Experience for Undergraduates (REU) Grant (PI is Samir Khuller, I am coPI). 3 years, $300,000. CNS 1262805

15. 2013. Intel Grant for Security Education. 1 year. $5000.00.

16. 2016-2018 NSF Research Experience for Undergraduates (REU) Grant (I am PI. Samir Khuller is coPI). 3 years, $375,000. CNS 1560193

17. 2019-2021. NSF Research Experience for Undergraduates (REU) Grant. (I am PI. Samir was the initial coPI. When he left UMCP John Dickerson was made co-PI.) CNS-1952352.

18. 2022-2024. NSF Research Experience for Undergraduates (REU) Grant. (I am the PI.) CNS-2150382.

Work in Progress

Working Papers and Books

1. (article) Better bounds on the Poly VDW numbers (with Clyde Kruskal, Justin Kruskal, Zach Price).

2. (article) The Large Canonical Ramsey Theorem (with Erik Metz).

3. (Book) Computational Intractability: A Guide to Algorithmic Lower Bounds (with Erik Demaine and Mohammad Hajiaghayi).

III Teaching, Mentoring, and Advising

Courses Taught

1. Spring 2010: HONR 209, Fair Division: From Cake-cutting to dispute resolution, 16 students.

2. Spring 2010: CMSC 452, Theory of Computation, 16 students

3. Spring 2011: CMSC 250H, Discrete Math (Honors Section), 30 students.

4. Spring 2011: CMSC 452, Theory of Computation, 32 students

5. Spring 2012: HONR 209, Fair Division: From Cake-cutting to dispute resolution, 16 students.

6. Spring 2012: CMSC 452, Theory of Computation, 32 students

7. Winter 2013: CMSC 389T, Discrete Math Plus Plus. 16 students.

8. Spring 2013 CMSC 452: Theory of Computation, 40 students

9. Spring 2013: CMSC 858, Ramsey Theory and its "Applications" 16 students.

10. Summer 2013 (Young Scholars Program): CMSC 198B, Computer Science: A Hands Off Approach. 24 students.

11. Fall 2013: HONR 209, Fair Division: From Cake-cutting to dispute resolution, 19 students.

12. Winter 2014: CMSC 389T, Discrete Math Plus Plus. 35 students.

13. Spring 2014: CMSC 452, Theory of Computation.

14. Spring 2014: CMSC 652, Complexity Theory. 9 students.

15. Summer 2014 (Young Scholars Program): CMSC 198B, Computer Science: A Hands Off Approach. 24 students.

16. Fall 2014: CMSC 452, Theory of Computation. 20 students.

17. Winter 2015: CMSC 389T, Discrete Math Plus Plus. 33 students.

18. Spring 2015: CMSC 250H, Discrete Math Honors. 23 students.

19. Spring 2015: HONR 209, Fair Division: From Cake-cutting to dispute resolution, 13 students.

20. Summer 2015 (Young Scholars Program): CMSC 198B, Computer Science: A Hands Off Approach. 16 students.

21. Winter 2016: CMSC 389T, Discrete Math Plus plus. 26 students.

22. Summer 2016: CMSC 198B, Computer Science: A Hands Off Approach. 20 students.

23. Winter 2017: CMSC 389T, Discrete Math Plus Plus. 40 students.

24. Spring 2017: CMSC 250, Discrete Math. Two sections of 120 students each.

25. Spring 2017: CMSC 452, Theory of Computation. 48 students.

26. Winter 2018: CMSC 389D, Introduction to Cryptography. 60 students

27. Spring 2018: CMSC 452, Theory of Computation. 50 students.

28. Spring 2018: CMSC 858F: Ramsey Theory and it "Applications" 24 students.

29. Fall 2018: CMSC-MATH 456 Cryptography, 85 students.

30. Spring 2019: CMSC 250H, Honors Discrete Math, 30 students.

31. Spring 2019: CMSC 452, Theory of Computation. 50 students.

32. Fall 2019: CMSC-MATH-ENEE 456 Cryptography, 85 students.

33. Spring 2020: CMSC 452, Theory of Computation. 50 students.

34. Spring 2020: CMSC 858F: Ramsey Theory and it "Applications" 26 students.

35. Fall 2020: CMSC-MATH-ENEE 456 Cryptography, 85 students.

36. Spring 2021: CMSC 250H, Discrete Structures Honors, 30 students.

37. Spring 2021: CMSC 452, Theory of Computation. 72 students.

38. Fall 2021: CMSC-MATH-ENEE 456 Crytography, 100 students.

39. Spring 2022: CMSC 250H, Discrete Structures Honors.

40. Spring 2022: CMSC 752, Ramsey Theory and its "Applications".

41. Spring 2024: CMSC 250H, Discrete Structures Honors, 13 students.

42. Spring 2024: CMSC 452, Theory of Computation. 50 students.

Course or Curriculum Development

1. Developed and taught the course *HONR 209: Fair Division.* This is an interdisciplinary course for honors students that combines ideas from mathematics, politics, and economics. The basic theme is: *given a resource, how to divide it fairly.* The course was developed in Spring 2002 and taught for the first time in Fall 2002 but keeps getting refined and changed in response to current events and research.

2. Developed and taught the course *CMSC 389T: Discrete Math Plus Plus.* This is a 3-week 1-credit winter course. The prerequisite is CMSC 250 (Discrete Math) and takes advantage of that by being able to pursue advanced topics in Discrete Math. The course was developed in Summer 2013 and taught in Winter 2013. I've taught it twice and the syllabus is stable now.

3. Developed and taught the course *CMSC 858R: Ramsey Theory and its "Applications".* (It is now CMSC 752.) This course was developed and taught in Spring 2013. In Spring 2022 it will be taught for the fourth time. This course gathers together theorems in Ramsey Theory that apply to Computer Science. Many of the proofs presented were educationally better than those in the literature.

4. Developed and taught the course *CMSC 198B: Computer Science: A Hands Off Approach.* This is a 3-week 3-credit summer course taught in the Young Scholars Program to High School Students. The theme is the kind of math they will need in computer science, with an emphasis on Cryptography. The course was developed and taught (for the first time) in Summer 2013. I've taught it twice and the syllabus is stable now.

5. CMSC 198B was modified to be a 1-credit winter course which was taught in Winter as CMSC 389D.

Advising: Research Direction

High School Students Research

1. Jacob Lurie. Surreal Analysis. Fall 1995- Spring 1996 (Westinghouse award, top prize) Went to Harvard.

2. Keenen Keeling. Empirical Studies in Computer Science. Fall 1996-Spring 1997.

3. Chris Sutton. Empirical Studies in Computer Science. Fall 1996-Spring 1997.

4. Brendan Connel. Taking probability seriously. Spring 1997-Spring 1998

5. James Lee. The Egg-Drop Game. Summer 2002. Went to UIUC.

6. Jefferson Pecht. Ramsey Theory. Summer 2006.

7. Joshua Yanovski. Complexity of Graph Isomorphism. Summer 2006. (Top 300 Intel Competition)

8. Paolo Casumbal. Partial Order Game. Summer 2006-Spring 2007.

9. Darnell Primus. Ramsey Theory. Fall 2006.

10. Simeon Andre. Cover times of Random Walks. Fall 2006.

11. Louis Wasserman. Monotone Circuits. Fall 2007, Spring 2008. (Top 20 Siemens Competition)

12. Aki Hogge. Ramsey Theory. Fall 2007, Spring 2008. Went to MIT.

13. Jourdan Walls. Cryptography. Fall 2007, Spring 2008.

14. Nicholas Ink, Cryptography, Spring 2008, Fall 2008, Spring 2009. Went to UMCP

15. Justin Kruskal, Ramsey Theory. Spring 2008. Went to UMCP

16. Rahul Rajagopalan. Summer 2008. Cryptography.

17. Nils Molina. Spring 2009. Ramsey Theory. Third in Yau Competition (On Team with Oza and Puttagunta). Went to MIT.

18. Anand Oza. Spring 2009. Ramsey Theory. Third in Yau Competition (On Team with Molina and Puttagunta). Went to MIT.

19. Rohan Puttagunta. Spring 2009. Ramsey Theory. Third in Yau Competition (On Team with Molina and Oza). Went to Stanford.

20. Scott Zimmerman. Spring 2009. Ramsey Games. Went to UMCP.

21. James Pinkerton. Spring 2011. Dup-Spoiler Games (Second in Siemens Competition, Joint with Rafael Setra) Semifinals in Yau Competition (team with Setra).

22. Rafael Setra. Spring 2011. Dup-Spoiler Games. (Second in Siemens Competition, Joint with James Pinkerton) Semifinals in Yau Competition (team with Pinkerton).

23. Daniel Farias. Spring 2011. Dup-Spoiler Games.

24. Alexander Briese. Spring 2011. Ramsey Games.

25. Thomas Zhang. Spring 2011. Ramsey Games. Went to MIT.

26. Samuel Zbarsky. Spring 2011. Ramsey Theory. Went to CMU.

27. John Purtilo. Summer 2011. Nim Games. Went to UMCP.

28. Steve Cable. Summer 2011, Fall 2011. Nim Games. Went to UMCP.

29. Sandow Sinai. Spring 2011, Summer 2011, Fall 2011. Ramsey Theory. Went to Hood College.

30. Jessica Shi, Fall 2011, Spring 2012, Fall 2013, Ramsey Theory. Went to Princeton.

31. Tucker Bane, Fall 2011, Spring 2012, Fall 2013, Ramsey Games

32. Ryan Cho, Summer 2013, Fall 2013, Ramsey Games. Went to University of Maryland at College Park.

33. Jared Marx-Kuo, Fall 2011, Spring 2012, fall 2013, Factoring. Went to University of Chicago.

34. James Liam, Fall 2011, Spring 2012, fall 2013, Factoring

35. Josh Brule, Spring 2012, Probability. Got a PhD from UMCP CS in 2019, working at John Hopkins Applied Physics Lab.

36. Victor Baules, Fall 2013, Collatz conjecture. Went to Cal Tech.

37. Victoria Tsai, Spring 2014-Fall 2013, Cake cutting

38. Adam Busis, Spring 2014-Fall 2014, Cake Cutting. Went to Harvey Mudd University.

39. Soumya Pattanayak, Spring 2014-Fall 2014, Computational Number Theory. Went to University of Maryland at College Park.

40. Patrick Cable, Spring 2014-Fall 2014, The Change Problem. Went to Univ of MD at College Park.

41. Robert Fleishman, Blair, Summer 2015, SAT Solvers for Ramsey Numbers.

42. Daniel Smolyak, Blair, Summer 2015, SAT Solvers for Ramsey Numbers

43. Naveen Roman, Blair, Summer 2015, The Change Problem

44. Jason Choi, Richard Montgomery, Summer 2015, Constructive Pigeonhole Principle.

45. Guang Cui. Blair, Fall 2015-Spring 2016, Ramsey Theory.

46. Yash Somaiya. Blair. Summer 2016. Factoring.

47. Fausto Zurita. Blair. Coloring Grids. Summer 2016

48. Anish Senapati. Blair. Coloring Grids. Summer 2016

49. Siddharth Taneja. Blair. Coloring Grids. Summer 2016.

50. Sung Yoo. Bergenson Academia. Summer 2016-Fall 2016

51. James Gao, Blair, Summer 2017, Game Theory-Jeopardy

52. Dihlan Saigado, Blair, Summer 2017, Game Theory-Jeopardy

53. Zan Xu, Blair, Summer 2017, Automata Theory

54. Eric Shen, Summer 2017, Automata Theory

55. Chandran Murthy, Summer 2017, Boolean Formula Evaluation

56. Thomas Del Vecchio, Summer 2017, Boolean Formula Evaluation

57. Le Do Summer 2017, Boolean Formula Evaluation

58. Gabe Udell Summer 2017 Truth Tellers and Liars in a grid

59. Eyob Tsegaye Summer 2017 Truth Tellers and Liars in a grid

60. Dilhan Selgado Summer 2017 Sums of Reciprocals

61. Andrew Mao, Summer 2017, Factoring.

62. Zan Xu Summer 2017 and Fall 2017. Small NFA's for Unary Languages

63. Eric Shen Summer 2017 and Fall 2017. Small NFA's for Unary Languages

64. Naveen Raman, Spring 2017 and Summer 2017, The Muffin Problem.

65. Naveen Durvula, Spring 2017 and Summer 2017, The Muffin Problem.

66. Sunny Yoo, Spring 2017 and Summer 2017, The Muffin Problem.

67. Guang Cui, Spring 2017 and Summer 2017, The Muffin Problem.

68. Johnathan Fuchs, Spring 2017, Ramsey Theory

69. Utas Santhosh, Fall 2017 and Spring 2018, Nim Games.

70. Patrick Wang, Spring 2018, Factoring and RSA.

71. Ipsa Mittra, Spring 2018, Factoring and RSA.

72. Joshua Liu, Spring 2018, Factoring and RSA.

73. Rafi Pedersen, Spring 2018, Factoring and RSA.

74. Eli Maynard, Spring 2018, Factoring and RSA.

75. William Bass, Spring 2018, Hat Problems.

76. Tyler Huangs, Spring 2018, Hat Problems.

77. Reynald Oliveria, Spring 2018, Hat Problems.

78. Kevin Zhou, Spring 2018, Hat Problems.

79. Sofia Bzhilyanskaya, Spring 2018, The Muffin Problem.

80. Daniel Wei, Spring 2018, The Muffin Problem

81. Connor Nguyen, Spring 2018, Summer 2018 Randomized Constructions.

82. Gabriel Naval, Spring 2018, Summer 2018 Randomized Constructions.

83. Daniel Monroe, Spring 2019, Fall 2019, Ramsey Theory

84. Elana Elman, Spring 2018, Ramsey Theory

85. Ken Tan, Summer 2018, Muffins.

86. Michael Chen, Summer 2018 (long distance), Factoring

87. Evan Guentenberg, Blair HS, Summer 2019, ML-Crypto

88. Peter Zhang, Blair HS, Summer 2019, ML-crypto

89. Patrick Wang, Blair HS, Summer 2019, ML-cryto

90. Ishita Chatterjee, Poolesville HS, Summer 2019, ML-crypto

91. Aakash Dutt, Summer 2019, Game Theory

92. Sam Nicks, Summer 2019, Game Theory

93. Augustin Jaureguir, Summer 2019, Game Theory

94. Daniel Li, Summer 2019, Graph Coloring

95. Charlies Shou, Poolesville HS, Spring-Summer-2019, Muffins

96. Joey Kim, Blair HS, Summer 2019- Muffins

97. Ikhalss Bhat, Thomas Jefferson HS, Summer 2019-Muffins.

98. Riya Kumar, Walt Whitman HS, Summer 2019-Muffins.

99. Erik Hao, Blair HS, Summer 2019- NIM with Cash

100. Elias Izmirlian, Poolesville HS, Summer 2019- NIM with Cash

101. Kevin Sui, Blair HS, Summer 2019, NIM with Cash.

102. SV Shrikar, Wotton HS, Summer 2019, NIM with Cash.

103. Jason Liu, Blair HS, Summer 2019, Neural Nets for Medical Diagnosis.

104. Shariar Vaez-Ghaemi, Blair HS, Summer 2019, Neural Nets for Medical Diagnosis.

105. Kasra Torshizi, Summer 2019, Graph Coloring

106. Sengh-HyunKwon, Summer 2019, Graph Coloring

107. Chancharik Mitra, Spring 2019, Factoring.

108. Adam Falcigno, Summer 2019, Muffins

109. Antara Hebbar, Summer 2019, Muffins

110. Natnael Kelkay, Summer 2019, Muffins

111. Noah Spector, Summer 2019, Muffins

112. Alex Kwang, Summer 2019, Muffins

113. Aarav Bajaj,Summer 2019, The Test Takers Dilemma

114. Tim Qian, Summer 2019, Breaking Crypto Systems.

115. Christine Chen, Blair HS, Summer 2019, ML-Crypto.

116. Doug Chen, Blair HS, Summer 2019, NIM with Cash. Went to John Hopkins University.

117. Gabriel Wu, Blair HS, Summer 2019, Breaking Crypto Systems.

118. Kevin Higgs, Blair HS, Summer 2019, Breaking Crypto Systems.

119. Albert Chen, Poolesville HS, Summer 2020, Fooling Captchas.

120. Max Chiu, Poolesville HS, Summer 2020, Fooling Capthcas.

121. Anjali Tangirala, Poolesville HS, Summer 2020, Classic Crypto.

122. Jeff Kyei-Asare, Blair Blair HS, HS, Summer 2020, Classic Crypto.

123. Shanmuka Sadhu, Summer 2020, Classic Crypto

124. Muhammad Islam, Reservoir HS, Summer 2020, ML-Ramsey.

125. Kandasamy Chokkalingam, Poolesville HS, 2020, ML-Ramsey.

126. Jason Liu, Blair HS, Summer 2020, Muffin Problem.

127. Michael Chu, Blair HS, Summer 2020, Simulating Dominion strategies.

128. Raymond Luo, Blair HS, Summer 2020, Simulating Dominion strategies.

129. Zayd Mahfuz, Eleanor Roosevelt HS, Summer 2020, Simulating Dominion strategies.

130. Alex Chen, Poolesville HS, Summer 2020, Factoring.

131. Ishaan Shrestha, Poolesville HS, Summer 2020, Factoring.

132. Marc Wagger, Blair HS, Summer 2020, Factoring.

133. Apurva Choudhary, Poolesville HS, Summer 2020, ML-Crypto.

134. Pascal Sossou, Poolesville HS, Summer 2020, ML-Crypto.

135. Rohan Vanga, Spring 2021, Secret Sharing

136. Ilye Hajiaghayi, Summer 2021, The Egg Game

137. Hyun Seo Jang, Summer 2021, The Egg Game

138. Benjamin Li, Summer 2021, Cryptography

139. Jade Palosky, Summer 2021, The Sequence Problem (Nate Silver Column),

140. Sumedh Vangara, Summer 2021, The Sequence Problem (Nate Silver Column),

141. Jeffery Tong, Summer 2021-Summer 2021, Set Cover.

142. Harikesh Kailad, Spring 2021-Summer 2021, Secret Sharing.

143. Ayaan Hussain, Spring 2021-Summer 2021, SAT solvers.

144. Konchok Shounu, Summer 2021, SAT solvers

145. Raina Westfield, Summer 2021, SAT solvers

146. Christopher Assiryani, Summer 2021, SAT Solvers

147. Jason Liu, Summer 2021, SAT Solvers

148. Muhammad Islam, Summer 2021, SAT Solvers

149. Tomas Harris, Summer 2021. The Sequence Problem (Nate Silver Column)

150. Chris Lee, Summer 2021. RSA and Factoring.

151. John Dinkel, Summer 2021, Linear Congruential Generators.

152. Benson Mwangachuchu, Summer 2021, John Dinkel, Summer 2021, Linear Congruential Generators.

153. Leo Peckerar, Summer 2021, ML-Crypto.

154. David Kaplan, Summer 2021, ML-Crypto.

155. Nathan Poje, Spring-Summer 2022, Points in the plane

156. Alan Whitman, Spring-Summer 2022, Points in the plane

157. Dylan Cheng, Spring-Summer 2022, ML-NIM

158. Shubham Bhatnagar, Spring-Summer 2022, ML-NIM

159. Nathan Cho, Spring-Summer 2022, Additive Combinatorics

160. Arnav Bali, Spring 2022, Crypto.

161. Julian Park, Spring-Summer 2022, Ramsey Theory

162. Soren Brown, Spring-Summer 2022, Ramsey Theory

163. Milan Tenn, Spring-Summer 2022, Ramsey Theory

164. Andrew Wagger, Spring-Summer 2022, SAT Solvers

165. Kiran Manoj, Spring-Summer 2022, SAT Solvers

166. Ilya Hajiaghayi, Spring-Summer 2023, Ramsey Theory

167. Nik Carlson, Summer-Fall 2023, Ramsey theory

168. Andy Cui, Summer-Fall 2023, Ramsey Theory

169. John Purdy, Summer-Fall 2023, Ramsey Theory

170. Kelin Zhu, Summer-Fall 2023, Ramsey theory

171. Zhu Lipeng, Summer-Fall 2023, Ramsey theory

172. Sudeep Abburu Cryotgraphy, Summer 2024-Fall 2024

173. Suhani Assija Cryotgraphy, Summer 2024-Fall 2024

174. Aaron Bhattachan Nim Games , Summer 2024-Fall 2024

175. Sayan Chandaroy Nim Games , Summer 2024-Fall 2024

176. Cynthia Chang Nim Games , Summer 2024-Fall 2024

177. Jonah Chopra-Khan Ramsey Theory , Summer 2024-Fall 2024

178. Olivia Guo Ramsey Theory , Summer 2024-Fall 2024

179. Ilya Hag 3rd Grade Ramsey Theory , Summer 2024-Fall 2024

180. Rhun Henderson Nim Games , Summer 2024-Fall 2024

181. Jessica Hsieh Ramsey Theory , Summer 2024-Fall 2024

182. Jesse Jing Nim Games , Summer 2024-Fall 2024

183. Rena Katz J-Day Sch Nim Games , Summer 2024-Fall 2024

184. Chaewoon Kyoung Ramsey Theory , Summer 2024-Fall 2024

185. Yifei Lin Ramsey Theory , Summer 2024-Fall 2024

186. Vihaan Mehta Nim Games , Summer 2024-Fall 2024

187. Fikur Mikuria Ramsey Theory , Summer 2024-Fall 2024

188. Sai Minnal Nim Games , Summer 2024-Fall 2024

189. Kate Patrabansh Ramsey Theory , Summer 2024-Fall 2024

190. Sujan Poudel Ramsey Theory , Summer 2024-Fall 2024

191. Sana Rao Cryotgraphy, Summer 2024-Fall 2024

192. Vidhu Sampath Cryotgraphy , Summer 2024-Fall 2024

193. Dylan Schenker Ramsey Theory , Summer 2024-Fall 2024

194. Arsh Shah Nim Games , Summer 2024-Fall 2024

195. Ryan Shim Cryotgraphy , Summer 2024-Fall 2024

196. Rohan Sinha Nim Games , Summer 2024-Fall 2024

197. Ricky Sun Ramsey Theory , Summer 2024-Fall 2024

198. Gautam Tangirala Nim Games , Summer 2024-Fall 2024

199. Jocelyn Yuan R Mont CRYPTO , Summer 2024-Fall 2024

200. Amie Zeng Northwest Ramsey Theory , Summer 2024-Fall 2024

Undergraduate Student Research

1. Jon Siegal. Recursive Algebra. 1984 At Harvard. Law School.

2. Sharon Kantrowitz. Recursive Graph Theory. 1985 At Harvard. Female.

3. Bruce Gaffney. Van Der Waerden Numbers. 1985. At Harvard.

4. Daniel Levine. Scheduling Algorithms. 1991

5. Jason Ellis. Heapsort. 1995. PhD at Georgia Tech. African-American.

6. Chi Tran. Heapsort. 1995

7. Chi Tran. Machine learning and Game theory. Gil Carmel. 1997. He founded 2D-boy, a computer game company.

8. Adam Bartgeil. Knights and Knormals. 2000. Professor at the University of Utah.

9. Kevin Kane. Constructive Proofs in Ramsey Theory. Spring 2000. Got a PhD in CS at UT-Austin.

10. Eric Everstine. RSA cracking. Eric Everstine. 2001. Got a PhD at UT-Austin.

11. Amy Castner. Private Information Retrieval. Spring 2002. Female.

12. Chad Groft. Zero Knowledge. Spring 2002. Got a PhD at Berkeley in Math.

13. Perfect and PluPerfect Digital Invariants. Scott Moore. Spring 2003

14. Nikolai Yakovenko. Analysis of a New Shift Cipher. 2004. (co-advised with Larry Washington)

15. Will Valencia. Creating a pseudo-random number generator. 2004

16. Will Valencia. Graph Games. Summer 2003.

17. Dan Halperin. Ramsey Games. Summer 2003.

18. Stuart Fletcher. Egg Game. Spring 2004.

19. Michael Fan. Richman Games. Spring 2004

20. Patrick Armstrong. Minesweeper. Fall 2005.

21. Andy Parrish. Purely Combinatorial Proof of Van Der Warden Type Theorems. Fall 2007. Got a PhD from UCSD in Math.

22. Katrina LaCurts. Tug of War. Fall 2006, Spring 2007, Fall 2007. Got a PhD from MIT in CS. Female.

23. Brent Dorman. Secret Sharing with Cards. Spring 2007, Fall 2007

24. Lynn Reggia. Secret Sharing with Cards. Spring 2007, Fall 2007. John Hopkins Applied Physics lab. Female.

25. Nick Sovich. Tug of war. 2010.

26. Paul Zimand. Tug of War. 2010. Got a PhD in statistics at CMU.

27. Jeff Jacobs, Spring 2011, The Test Takers Dilemma. Got a PhD at Stanford in CS.

28. Josh Brule, Spring 2012, Probability. PhD in CS from UMCP.

29. Takako Nishimura. The Test Taking Problem. Summer 2012. Female.

30. Krishna Pai, Nim Games. Fall 2013

31. Tucker Bane. Ramsey Games Tucker Bane. 2013.

32. Michael Roberts. Lower bounds on Proofs of PHP. Fall 2013, Spring 2014

33. Xiaotian Zheng, Nim Games. Fall 2013, Spring 2014

34. Brendan Good. Ramsey Games. Got a Masters Degree in Math from UMCP.

35. Andrew Lohr. Cake Cutting. 2013. Got a PhD from Rutgers in Math.

36. Vincent Zell, Nim Games, Fall 2014. Software Enginner

37. Phong Dinh, Nim Games, Fall 2014. Software Enginner at Meta.

38. Doug Ulrich. Distinct Volume Sets. 2014. Got a PhD in Math from UMCP.

39. Eric Weaver. Ramsey Games. 2014 (REU program). Software Eng at Wrench.io

40. Natalie Wilkerson. Ramsey Games. 2014 (REU program)

41. Annie Lu. Ramsey Games. 2014 (REU program)

42. Vincent Zell, Test Taking Problem , Spring 2015. Software Eng.

43. Phong Dinh, Test Taking Problem, Spring 2015. Facebook.

44. Devin Gajewski. Test taking problem, Spring 2015. Senior SW at Playe First Games.

45. Hannah Christenson. Using SAT solvers to find Ramsey Numbers. Summer 2015 (REU) Female. Software Eng at Asana.

46. Burcu Canakci. Using SAT solvers to find Ramsey Numbers. Summer 2015 (REU). PhD from Cornell in CS. Female.

47. Nichole McNabb. Using SAT solvers to find Ramsey Numbers. Summer 2015 (REU). Masters from Waterloo in CS. Female

48. Albert Cheu. Van der Warden Games. Summer 2015 (REU). Got a PhD from Northeastern in CS.

49. Luciann Kiffer. Van der Warden Games. Summer 2015 (REU). Got a PhD from Northeaster in CS. Female. Hispanic.

50. Miguel Berlanga. Loaded Dice. Summer 2016 (REU). Hispanic.

51. Peter Tian. Loaded Dice. Summer 2016 (REU). PhD from Princeton Operations Research.

52. Vince Cozzo. Sums of Reciprocals. Spring 2016

53. Natalie Collina. Game Theory. Summer 2017 (REU). Getting a PhD from Harvard CS. Female.

54. Jessica Abramson. Game Theory. Summer 2018 (REU). Female.

55. Daniel McVicker. Secret Sharing. Spring 2017.

56. Sam Zbarsky. Coefficient Choosing Game. Spring 2017. Got a PhD from Princeton.

57. Jacob Prinz. Muffins. Spring 2018-Spring 2020. Getting a PhD from UMCP in CS.

58. Daniel Smolyak. Muffins. Spring 2018-Spring 2020. Getting a PhD from UMCP in CS¿

59. Erik Metz. Muffins. Spring 2018–Spring 2020. Working in Finance.

60. Sanchin Pandey. Muffins. Summer 2018.

61. Jamie Brassel, Cryptography, Summer 2018.

62. Nathan Hayes, Alternative models of computation, Summer 2019-Summer 2020. Univ of Ill at Orbana Grad School.

63. Patrick O'Toole. Probability. Spring 2019. Software Enginner Digital Infuzion.

64. Jamie Brassel, Game Theory, Summer 2019.

65. Stephanie Warman, Muffins, Summer 2019 (REU). Female.

66. Leenah Shalboub, Muffins, Summer 2019 (REU). Female.

67. Brian Holt, Factoring, Fall 2019. Grad Student at UMCP in Enginnering

68. Ariel Steinsaltz, ML for Ramsey Games, Summer 2020. HS Math Teacher. Female.

69. Xinhe Zhou, ML for Ramsey Games, Summer 2020. Female.

70. David Zhen, ML for Crypto, Summer 2020. Went to Industry.

71. Alex Brassel, SAT solvers and Ramsey Theory, Fall 2020. Software Eng at Databricks

72. John Pomerat, ML for Crypto Summer 2020, Spring 2021. Quant Trader.

73. Shrikar Vasisht, ML for Crypto Spring 2021

74. Ekesh Kumar, Ramsey Theory, Spring-Summer 2021. Getting a Phd from UMCP in Math.

75. Chris Berry, Ramsey Theory, Summer 2021.

76. Guido Ambasz, Secret Sharing, Spring 2021. Software Eng at Draftkings

77. Kyle Ryeter, Secret Sharing, Spring 2021.

78. Matthew Chan, Quad Sieve, Spring 2021. PhD Student UMCP Computer science

79. John Bauer, Quad Sieve, Spring-Summer 2021.

80. Zongxia Li, Quad Sieve, Spring-Summer 2021. PhD Student UMCP Computer Science

81. Jefferey Zhang, RSA and Factoring, Spring 2021. Mathworks

82. Charlie Lu, RSA and Factoring, Spring 2021

83. Edmund Horsch, Spring 2021-Summer 2021, Planar 3DM

84. Aakash Dutt, Spring 2021-Summer 2021, Desc Complexity Theory. Software Engineer.

85. Jeff Ginzberg, Spring 2021, Planar 3DM

86. Doug Chen, Hardness of approximation, Summer 2021

87. Rishab Pallepati, Hardness of approximation, Summer 2021

88. Nathan Hayes, Hardness of approximation, Summer 2021. Univ of Ill at Urbana Grad School

89. Liron Karpati, SAT Solvers, Spring 2021

90. Robert Rust, Ramsey Orderings, Summer 2022. State Univ of NY at Binghamton Grad School

91. Nathan Hurtig, Ramsey Ordering, Summer 2022. Univ of Washington Grad School

92. Joanna Boyland, Ramsey Orderings, Summer 2022. CMU Grad School. Female

93. Ainesh Chatterjee, Proofs that primes are infinite, Summer 2023-Fall 2023. JHU APL.

94. Gary Peng, Induced Ramsey Theory, Summer 2023-Fall 2023

95. Rishi Cherukuri, Ramsey Theory, Summer 2024

96. Anirudha Kumar, NIM games, Summer 2024

97. Josh Oring, NIM games, Summer 2024

98. Alex Plisov, NIM games, Summer 2024

99. Soren Brown, SAT Solvers, Summer 2024

Masters Students

Adviser on Masters Thesis

1. Geometric algorithms. Lazarus Kikas. 1997.

2. Private Information Retrieval. Charles Lin. 2001.

3. Towers of Hanoi. Andrey Rukin. 2004

4. Bit Probe Data Structures. Ryan Blue. 2009.

Adviser on Masters Scholarly Papers

1. Matching in Recursive Graph Theory. Mike Lockwood. Spring 1987.

2. Functional NP-Complete Problems. Stuart Pearlman. Spring 1988.

3. Message Passing and Mutual Exclusion. Susan Flynn. Spring 1988.

4. Structure of the Turing Degrees. David Kamishlian. Spring 1988.

5. Recursive Edge Colorings. Gary Benson. Spring 1989.

6. Recursive Edge Colorings. Terry Grant. Spring 1990.

7. Truth Table Degrees. William Setzer. Spring 1990

8. Parallel Algorithms. Larry Herman. Summer 1990

9. Communication Complexity. Paul Timmel. Spring 1991

10. Recursive Vertex Colorings. Yeung Chung Lee. Spring 1995.

11. Concrete Complexity. Alex Chan. Spring 1997.

12. The Grid Coloring Problem. Charles Glover. Spring 2006.

13. Better bounds on Rado Numbers. Russell Moriarty. Spring 2010.

14. Hardness of approximation. Erika Melder. Fall 2021.

15. Machine learning for NIM with Cash. Joshua Twitty. (Te native) Spring 2022.

On Masters Thesis Committee

1. Brian Sutton. Primality Testing. 1988.

2. Mary Conrad. Number Theory. 1990.

3. Amin Gilani. Quantum Computing. 2022.

Doctoral

Doctoral Adviser

1. Machine Learning with Queries and Oracles. Mark Pleszkoch. Spring 1990. Went to IBM.

2. On the quality of queries. Katia Guimaraes. Spring 1992. Went to University of Recife (Brazil).

3. On queries in computational learning theory and Combinatorial problems. Andrew Lee. Summer 1998. Went to State University of New York at Oneonta.

4. Implementing $WS1S$ via Finite Automata. James Glenn. Fall 1998. Went to Loyola College.

5. Empirical studies in parallel sorting (jointly advised with Clyde Kruskal). Evan Golub. Spring 1999. Went to University of Maryland at College Park.

6. Finite Model Theory (jointly advised with David Kueger). Walid Gomma. Summer 2007. Went to Alexandria University (Egypt).

7. SAT Solvers. Carl Anderson. Spring 2007. Went to BBN.

8. Graphs and Logic (jointly advised with Chris Lastowski.) Shaopeng Zhu. Spring 2023

On Doctoral Committee

1. Inductive Inference. Mahendran Velauthapillai. Spring 1986.

2. Step Logics. Jennifer Drapkin. Spring 1988.

3. Model Stability Theory. Phil Steitz. Spring 1990.

4. Programming Languages. Dominic Duggan. Spring 1990.

5. Model Theory. Pat Sime. Spring 1992.

6. Pattern Matching. James Helmreich. Spring 1992.

7. Pattern Matching. Gary Benson. Spring 1992.

8. Model Theory. Tony Greif. Spring 1993

9. Recursion Theory. Kevin Rappoport. Summer 1993

10. Neural Nets. Georgia Martin. Fall 1993

11. Root Numbers of Fibers. Gary Flake. Fall 1993

12. Algorithms in Ring Theory. Elisabeth Manduchi. Spring 1994

13. Artificial Intelligence. J. Lyn Miller. Spring 1994.

14. Artificial Intelligence. Subrata Ghosh. Spring 1994

15. Abstract Algebra. Cheng-Chieh Lee. Spring 1995.

16. Program Transformations. Elena Black. Spring 1995

17. Empirical Modeling. Wayne Kelly. Spring 1996

18. Parallelism. Bill Thomas. Spring 1997

19. Model Theory. Suleyman Sahinalp. Spring 1997

20. Model Theory. Amanda Lubell. Summer 1997.

21. Parallelism. Brian Tornaquist. Summer 1997

22. Number Theory. Lee Guan. Summer 1997

23. Number Theory. Kimberly King. Spring 1998.

24. Model Theory. Stephanie Cawthorne. Spring 1998

25. Scheduling. Phillip Korn. Summer 1998.

26. Scheduling. Randeep Bhatia. Summer 1998.

27. Logic Programming. Parke Godfrey. Spring 1999.

28. Number Theory. Mark Morgan. Spring 1999.

29. Number Theory. Mu-Ling Chang. Spring 2001.

30. Number Theory. William Mcgraw. Spring 2001.

31. Logic. Mee Kim Knystautas. Spring 2001

32. Natural Languages Processing. Habash Nizar. Spring 2003.

33. Number Theory. Mike Roberts. Summer 2003.

34. Number Theory. Ed Eikenberg. Spring 2004

35. Natural lang processing. Dave Zajic. Fall 2006

36. Number Theory. Kathryn Truman. Spring 2007

37. Number Theory. John Vogler. Spring 2007

38. Number Theory. Susan Schmoyers. Summer 2007.

39. Number Theory and Crypto, Greg Bard, Summer 2007

40. Cryptography and Number Theory. Tsz Wo Sze. Fall 2007.

41. Cryptography. Chiu-Yuen Koo. Fall 2007.

42. Model Theory. Chris Shaw. Spring 2008

43. Model Theory. Greg Johnson. Spring 2008

44. Software engineering. Cyntrica Eaton. Spring 2008.

45. Cryptography. Tom Draper. Spring 2009.

46. Model Theory. Justin Brody. Spring 2009.

47. Number Theory. Eleni Agathocleous. Summer 2009.

48. Spring 2010. Punarbasu Purkayastha. Codes.

49. Software Engineering Sandro Fouche. Fall 2010.

50. Model Theory Vincent Gingona. Spring 2011.

51. Graph Theory and Social Networks. Tom DuBois. Spring 2011.

52. Unitary Transformations. Sean Rostami. Fall 2011.

53. Programming Languages. Martin Mah. Fall 2011.

54. Algorithms. Koyel Mukherjee. Fall 2013.

55. Artificial Intelligence. Robert Alford. Fall 2013.

56. Human Computer Interaction. Megan Monroe. Spring 2014.

57. Number Theory David Blagg. Spring 2014.

58. Number Theory Angela Hennessy. Spring 2014.

59. Physics. John Mictchell. Fall 2014.

60. Number Theory. Morgan Stern. Fall 2014

61. Hierarchial goal networks. Vikas Shivshankar. Spring 2015

62. David Harris. Prob algorithms Spring 2015

63. Richard Rast. The Borel Complexity of Isomorphism for some first-order theories. Spring 2016.

64. Ran Cui. The real-quaternionic indicator of irreducible self-conjugate representations of real reductive groups. Spring 2016.

65. item Manish Purohit. Data-Aware scheduling in data centers.

66. Srimathy Srinivasan. Motivic Decomposition. Spring 2016

67. Melika Abolhasani. Allocation in Networks with Economic Applications. Spring 2016.

68. Omar Shehab. (UMBC) Quantum Computing Summer 2016.

69. Sean Kelly. Adeles of surfaces and the Riemann hypothesis for curves Fall 2016.

70. Marc Horn. Combinatorial formulas for test functions. Spring 2017.

71. Nathaniel Monson. Math. Fall 2018.

72. Sean Ballentine. Codes on curves with hierarchical locality from covering maps of curves. Fall 2018.

73. Doug Ulrich. Applications of Set Theory to Model Theory. Spring 2018

74. Adam Lizzi. Computations for the Abelinaized etale fundamental group of curves of genus one or two. Spring 2018

75. Rebecca Black. Motive Cohomology of groups of order p^3. Spring 2018

76. Josh Brule. Causal Programming. Spring 2019

77. Eric Lownes. On the Gromov-Witten Theory of P^1-Bundles over ruled surfaces.

78. Danul Gunatillkea. The theories of Baldwin-Shi hypergraphs: their atomic models and regular types. Spring 2019.

79. Jonathan Fernandes. Special Unipotent Arthur packets for real reductive groups. Spring 2019.

80. Saeed Seddighin. Campaigning via LPS: Solving Blotto and Beyond Spring 2019.

81. Yousheng Shi. Generalized special cycles on locally symmetric spaces and the cohomology of Weil representations. Summer 2019.

82. Arijt Sehanobish. Universal deformations and P-adic L-functions. Summer 2019

83. Airella Kirsch. Ranks of p-class groups in cyclic p-extensions of anti-cyclotomic Z_2-extension. Summer 2019.

84. Yijie Gao. Center of $H_R(0, c_s)$ associated to a pro-p-Iwahori Weyl group. Summer 2019

85. Weikun Wang. Moduli space of sheaves on Hirzebruch Orbifolds. Summer 2019

86. Kirk Ryan. Positive tuples of flags and piecewise circular fronts in the 3-dim Einstein universe. Summer 2019.

87. Hadi Yami. Fairness guarantees in allocation problems. Fall 2019.

88. Phillip Dasler. Efficient algorithms for coordinated motion in shared spaces. Spring 2020.

89. Ke Xue. Affine Pavings of Hessenberg Ideal Fibers. Spring 2020.

90. Tao Zhang. Stable Pair Theory on Toric orbifolds and colored reverse plane partitions. Spring 2020.

91. Minsung Kim. Dynamical systems of effective equidistribution of flows on nilmanifods. Fall 2020.

92. Huijing Gong. Fall 2020. Improving robustness and versatility of lattice-based cryptography.

93. Zitan Chen. Fall 2020. Codes with efficient erasure correction.

94. Steve Reich. Spring 2021. Class groups of char-p over function fields.

95. Huijing Gong. Spring 2021. Cryptography.

96. Stephen Gilles. Spring 2021. Teichmuller spaces. Cluster Algebras.

97. Dani Kaufman. Spring 2021. Cluster Ensembles.

98. Hamid Al-Saqban. Spring 2021. Teichmuller dynamics.

99. Zack Greenberg. Fall 2021. Cluster Algebras.

100. Phillip Wertheimer. Fall 2021. Breaking Substitution ciphers.

101. David Pincus. Fall 2021. Class Numbers.

102. Zachary Greenberg. Fall 2021. Cluster Algebras.

103. Priyankur Chaudhuri. Spring 2022 Algebraic Geometry.

104. Nathan Dykas. Spring 2022. Arithmetic Surfaces.

105. Liam Fowl. Spring 2022 Machine Learning.

106. Zhao Liu. Spring 2022. Quadratic Differentials and the Monodromy of the Hitchin fibrations. Math.

107. Jackson Hopper. Spring 2024. The Twinning character formula for split groups and a cellular paving for quasi-split groups. Math.

108. Spring 2024. Cyclotomic Z2-extensions of real quadratic fields with cycle Iswasawa Module. Josue Avila. Math.

109. Spring 2024. Jermain McDermott. Eventually Stable Quadratic Polynomials over $Q(i)$.

110. Spring 2024. Jordan Hirsch. Math. Polynomials with Equal Imeges of Number Fields.

111. Spring 2024 Chengze Duan. Math. Good Position Braids, Transversal Slices, and Affine Springer Fibers.

112. Summer 2024. Noah Chrein. Math. Ontology as Cosmic Type Chain.

113. Summer 2024. Shin Eui Song. Math. Langlands-Kottwitz Method on Moduli Spaces of Global shtukas.

114. Summer 2024. Emily Kaplitz. Computer Science. Implementing Universal Design to Support Neurodivergent Students in Undergraduate Introductory Computer Science Classes.

Outside Reader for a Doctoral Defense

1. Arun Sharma, Univ. of NY at Buffalo, Inductive Inference 1990

2. Tim McNichol, GWU, Recursion Theory 1995

3. Tizra Hirst, Weizmann Institute, Infinite Recursive Structures 1992

Advising (Other than Research Directions)

Undergraduate
Below is a list of all undergraduates who I lead on a reading project. I omit those that also did research with me as they are listed elsewhere.

1. Kent Kimball. Nim Games. Fall 1989

2. Dan Wilkerson. Nim Games Fall 1990

3. David Baggett. Scheduling Algorithms Spring 1991 He went on to get a Masters degree from MIT and later powered ITA-Software which now powers Orbitz.

4. Vimarsh Bakaya. Nim Games. Fall 1994

5. David Zimmerman. Nim Games. Fall 1995

6. Ali Saqib. Nim. Games. Fall 1995

7. David Peng. Casino Game. Summer 1996, Fall 1996.

8. Anna Winkler. Heap Sort. Fall 1996

9. Ilya Burdman. Fast Fourier Transforms. Fall 2002

10. Jon Chapin. 3-free sets. Fall 2004

11. Jeff Markey. Bin Packing. Spring 2005

12. Yosif Berman, Erdos-Szekeres problem. Spring 2008

13. Lee Stephen Green, Extremal Combinatorics. Spring 2008

14. Gordon Sommers, Classical Crypto. Summer 2008.

15. Sean Wilner, Ramsey Theory. Summer 2008

16. Rohit Gopal, Ramsey Theory. Summer 2009

17. Zijiang Yang. Duel and Truel games. Fall 2008, Spring 2009.

18. Arseni Verner. Nim Games. Fall 2008, Spring 2009.

19. Jeff Jacobs. NP-completeness. Fall 2011. He got a Masters at Stanford in Computer Science.

20. Jeff Jacobs. Probability Spring 2012

Graduate

Below is a list of all graduate students who I lead on a reading project. I omit those that also did research with me as they are listed elsewhere.

1. Rameshkumar Sitarman. Inductive Inference. Fall 1987, Spring 1988

2. Sofoklis Efremidis. Hilbert's Tenth Problem. Spring 1988

3. Bill Regli. Complexity theory over the reals. Spring 1991

4. Gary Flake. Complexity theory over the reals. Spring 1991

5. Steven Smith. Complexity theory over the reals. Spring 1991

6. Daniel Eshner. Complexity Theory. Spring 1991

7. Arkady Yerukhimovich, Communication Complexity. Fall 2006-Fall 2007

8. Kin Ma, Randomized Computation. Fall 2006-Fall 2007

Faculty Mentorship

1. I mentored Jon Katz his first year, 2001.

2. I mentored Clyde Kruskal Fall 2020-Spring 2021.

IV Service and Outreach

Editorial Boards

1. 1992-2008 Managing Editor for *Information and Computation* (I+C).

2. 1994-1995 Guest Editor for *Journal of Computing and System Sciences* (JCSS). Special issue on Computational Learning Theory Conference 1995.

3. 1995-2008 Associate Editor for *Journal of Computing and System Sciences* (JCSS).

4. 1997-2015 Book Review Editor for *Special Interest Group- Algorithms and Computability Theory News* (SIGACT News).

5. 2016- Open Problem Column Editor for *Special Interest Group- Algorithms and Computability Theory News* (SIGACT News).

Reviewing Activities for Journals, Conferences, and Books
 I have refereed many articles for the following journals, and books for publsishers.

1. Information and Computation

2. Journal of Computers and Systems Science

3. Mathematical Systems Theory

4. Operations Research/Management Sciences

5. Theoretical Computer Science

6. Math Reviews

7. Journal of Symbolic Logic

8. Information Processing Letters

9. Notre Dame Journal of Logic

10. Journal of Parallel and Distributed Computing

11. SIAM Journal of Computing

12. SIAM journal of Discrete Math

13. Symposisum on Discrete Algorithms (SODA)

14. Bolyai Memorial Series

15. American Math Monthly

16. Integers Journal

17. Cambridge University Press

18. Springer-Verlag

19. World Scientific

Reviewing Activities for Agencies and Foundations

I have reviewed at least two grants for the following organizations.

1. National Science Foundation Grants

2. National Academy of Sciences Grants

3. NDSEG Program Review Panel (Reviewing grants for Grad Students funded by Defense.)

4. SMART Scholarship Review Panel.

5. Israel NSF grant reviewer.

6. Saudi Arabian NSF.

7. Siemens Foundation.

8. Intel competition.

9. Regeneron competition.

V   Professional Service

Membership

1. Member, Association of Computing Machinery.

2. Member, American Math Society.

3. Member, Mathematics Associate of America .

Conferences- Local Arrangements

1. Conference on Computational Complexity, 2007

Conferences-Program Committee

1. 1991- Computational Complexity Conference. (CCC)

2. 1994- Computational Learning Theory. (COLT)

3. 1996- Computational Learning Theory. (COLT)

4. 1998- Computational Learning Theory. (COLT)

5. 2006- Algorithmic Learning Theory. (ALG)

6. 2010- North American Annual Meeting of the Associate on Symbolic Logic.

7. 2011-Theory and Models of Computation.

8. 2015-International conference on Knowledge Discovery and Information Retrieval. (KDIR)

9. 2016-International conference on Knowledge Discovery and Information Retrieval. (KDIR)

VI   Campus Service

Departmental

1. 1985- Member, Theory Field Committee

2. 1985- Organizer, Theory of Computing Seminar (Maryland/Washington Local area. Commonly called the CATS seminar)

3. 1986-1987 Participated in Academically Talented Open House for High School Students.

4. 1986- Graduate Admissions Committee (except 1991,1992)

5. 1986 Chairman of Summer Theory Comprehensive Exam

6. 1986- Chairman, Department Honors Committee (except 1991)

7. 1986-2006 New Faculty Orientation Committee (except 1991)

8. 1987- Grad Student Orientation (for Computer Science)

9. 1988- Grad Student Orientation (for Computer Science)

10. 1988- Speaker at High School Day (Spring)

11. 1989-Undergraduate affairs committee

12. 1988- Chairman of Summer Theory Comprehensive Exam

13. 1989- Speaker at High School Day (Spring)

14. 1989- Chairman of Summer Theory Comprehensive Exam (with Dave Mount)

15. 1989-present. Math Competition Committee (Math Department)

16. 1989 Supervised a high school student for UMIACS Summer High School program

17. 1990- Chairman of Winter Theory Comprehensive Exam
    1990- Grad Student Orientation (for Computer Science)

18. 1990- Chairman of Summer Theory Comprehensive Exam

19. 1990- Committee to form syllabus for CMSC 280, Member

20. 1990 Participated in Academically Talented Open House (recruiting talented high school students)

21. 1992-1996 Honors Research Award Committee

22. 1992- Chairman of Summer Theory Comprehensive Exam

23. 1992-1993 Chairman of Theory Field Committee

24. 1992- Undergraduate Education Committee

25. 1993-2004 Chairman, Teaching Evaluation Committee

26. 1994-2004 Teaching Evaluation Committee for full time lecturers

27. 1994-1996 Distinguished Dissertation committee

28. 1994 Chairman of Summer Theory Comprehensive Exam

29. 1994- New Grad Student Orientation

30. 1994-1995 Faculty Recruiting Committee

31. 1995 Graduate Retention Fellowship Committee

32. 1995 Chairman of Summer Theory Comprehensive

33. 1995-1996 Chairman of Holiday Entertainment Committee

34. 1996 Chairman of Winter Theory Comprehensive

35. 1997 Chen Scholarship Committee

36. 1997 Senior Summer Scholars Selection Committee

37. 1998 Minority Recruitment committee.

38. 2000- New Faculty Orientation

39. 2000-2004 Undergraduate Co-chair.

40. 2000-2006 Participated in Academically Talented Open House (recruiting talented high school students)

41. 2001 Faculty Recruitment Committee.

42. 2001 Speaker at Workshop for Women in Academia.

43. 2003-2005 Theory Field Committee Chair

44. 2003- Minority Recruitment Chair

45. 2006-2008 Judge at Workshop for Women and Minority Grad Students

46. 2006-now Teaching Evaluation Committee.

47. 2008 Middle States Eval Committee for PhD. Chair.

48. 2011-2011 College APT committee

49. 2013 Middle State Eval Committee for PhD Defenses. Chair

50. 2013 Middle State Eval Committee for Theory Courses. Chair.

51. 2013 Middle State Eval Committee for intros to PhD's . Chair.

52. 2014 Tandy Warnow Full Prof Committee

53. 2014 Andrew Childs Tenure Committee

54. 2014 Scott Aaronson Full Prof Committee

55. 2014 Lectures Search Committee

56. 2014 Gemstone discussant

57. 2014 Banneker Key Greeter

58. 2014 Organized Theory Day

59. 2014 Holiday Entertainment

60. 2014 Fund raising: Obtained $25,000 from Jacob Lurie for REU program.

61. 2015 Banneker-Key Scholarship Committee.

62. 2016 Gemstone discussant

63. 2016-present High School Student Research Liaison

64. 2016-present Learning Outcomes Committee, Chair. (Used to be called Middlestates).

65. 2021-2022 Diversity, Outreach, and Corp. Funding committee for internal report

66. 2024- CS Scholarship Committee

College

1. 1999-present. Member, The Mathematics Competition Committee. (Makes up and supervises *The University of Maryland Mathematics Competition.*)

2. 1989-1994, Member, CMPS Committee on Cognitive Studies

3. 1990-1994, Member, Calculus Reform Committee

4. 1992-1993 College APT committee

5. 1993-2004 Summer Orientation of Freshman

6. 1994 First Two Years Committee

7. 2000 Supervised Governors School Program for High School Students in Computer Science

8. 2010-2012 College APT committee.

VII   Awards and Honors

Teaching Awards

1. 1993- Certificate of Teaching Excellence (In Recognition of Significant Influence and Contributions to the Education of Outstanding Graduating Senior Sergey Brin.)

2. 1994 Teaching Excellence Award (Honorable Mention), Department of Computer Science

3. 1995 Service award for *Outstanding Contribution to Seniors* (given by the office of the Vice President for Student Affairs and the Senior Council).

4. 1997 Teaching Excellence Award (Honorable Mention), Department of Computer Science

5. 1998 Teaching Excellence Award (Honorable Mention), Department of Computer Science

6. 2000 Teaching Excellence Award, Department of Computer Science 2002

7. 2004 Certificate of Teaching Excellence (In Recognition of Significant Influence and Contributions to the Education of Outstanding Graduating Senior Amy Castner.)

8. 2007 Certificate of Teaching Excellence (In Recognition of Significant Influence and Contributions to the Education of Outstanding Graduating Senior Katrina LaCurts.)

9. 2012 Teaching Excellence Award, Department of Computer Science