

Education

A.B. Harvard College, with honors in physics

PhD University of Wisconsin-Madison in mathematics under Richard Brualdi (with a minor in education)

Professional Experience

Junior high school math teacher, Foote School, New Haven, CT 1970-72

Taught arithmetic in primary school in Tanzania 1973

Tutored all failing math students at Hebron Academy in Maine 1974

Taught math, science, and reading at Indian Community School, a high school for Native Americans in Milwaukee 1975-76

Graduate Teaching Assistant in math department at University of Wisconsin-Madison 1977-83

Teacher and counselor in Summer Opportunity Program, a program to recruit and develop minority students at Univ. of Wisconsin summers 1980,1981

Assistant Professor of Mathematics at Iowa State University 1983-85

Visiting Assistant Professor at Amherst College in Massachusetts 1985-86

Fulbright Lecturer at University of Malawi 1986-87

Accompanied family to Thailand; gave lectures at Chiang Mai University 1987-88

Visiting Assistant Professor at West Virginia University 1988-89

Assistant Professor at West Virginia University 1989-96

Accompanied family to Thailand; gave lectures in Thailand 1992

Associate Professor, West Virginia University 1996-2001

Sabbatical leave at Institute for Mathematics, Academy of Sciences, Budapest 1998-99

Professor of Mathematics at West Virginia University since 2002

Visiting scholar at Shanghai Jiao Tong University 2008

Visiting scholar at Shanghai Jiao Tong University 2015

Teaching

Main graduate teaching specialties: combinatorics, graph theory, linear algebra

Teaching grants:

Fulbright grant at University of Malawi, 1986-87

Dwight D. Eisenhower Math and Science Education Act grant to teach a discrete math course for secondary math teachers by satellite TV 1995

Teaching awards:

Outstanding Teaching Assistant (one of five among all teaching assistants in College of Arts and Sciences) at Univ. of Wisconsin-Madison 1962

John Williams Outstanding Teacher Award, awarded by the Honors Program at West Virginia University 1997

Outstanding Teacher Award, Eberly College of Arts and Sciences 2002

Inducted into Mountain, an honor society at WVU which recognizes outstanding teaching and service, 2003

WVU Foundation Outstanding Teacher Award (highest teaching award at West Virginia University) 2005

Courses and Curricula designed:

Two undergraduate courses at Iowa State University

Many undergraduate courses at West Virginia University. I have been the main instructor for

The Honors calculus courses, teaching many of the best undergraduate math students

Helped restructure mathematics program at University of Malawi (1986-87)

Co-authored COMAP module on fair division (1996)

Designed a satellite TV discrete math course for secondary math teachers (1995)

Helped design the capstone course for WVU math majors

Designed and taught four new graduate combinatorics courses, including coding theory and extremal set theory

Ran training sessions for Putnam Exam nearly every year since 1994.

Graduate student committees: Served on about 15 Masters committees and 35 PhD committees in mathematics at WVU

Mentored about 20 senior Capstone Projects

Served on about 25 DMA and PhD committees in music (piano) at WVU

Research

Ph.D. thesis on the permanent function.

Edge colorings in graphs.

Switching vertices in graphs (linear algebra), Fibonacci polynomials

Extremal combinatorics related to Ramsey's and Turan's theorems.

Recent work on polychromatic colorings of the integers and the hypercube.

Recent work on inducibility in the hypercube.

PhD students: Matthew Cropper (1998), Yongbin Ou (2005), Ryan Hansen (2022)

Professional Presentations

"The Laplacian Permanent", Minneapolis, 1984

"Maximum permanents of order n $(0,1)$ -matrices with at most $2n$ zeros", Carbondale, IL, 1988

"Minimum subpermanents of $(0,1)$ -matrices with uniform row and column sums", Southeastern Conf. on Combinatorics, FL, 1989

"Finite sets of integers with no solutions to $x+y=3z$ ", Carbondale, IL, 1989.

"Sets of integers with no solutions to $x+y=kz$ ", Southeastern Conf. on Combinatorics, FL, 1990

"Remarks on Ramsey theory", Invited address to Allegheny section of MAA, Pennsylvania, 1990

"The lottery and Turan's problem", Southeastern Conf. on Comb., Baton Rouge, 1991

"Remarks on a weighing problem", Chiang Mai, Thailand, 1992

About fifteen lectures and seminar talks on combinatorial topics at four universities

in Thailand, the University of Malaysia, and the National Univ. of Singapore, 1992

"Subsets of the unit interval with no solutions to $x+y=kz$ ", Southeastern Conf. on

- Combinatorics, FL, 1993
- “Sum-free sets and Ramsey’s theorem”, invited lecture at Westminster College, PA, 1994.
- “Combinatorial games”, invited lecture at Amherst College, MA, 1994
- “Permutation graphs, Petersen graph, and edge-3-coloring”, Southeastern Conf. on Combinatorics, FL, 1995
- “Switches in a grid”, Southeastern Conf on Combinatorics, Baton Rouge, 1996
- “Uniquely edge-3-colorable graphs”, Southeastern Conf. on Combinatorics, Baton Rouge, 1996
- “Triangular blocks of zeros in $(0,1)$ -matrices with small permanents”, Southeastern Conf. on Combinatorics, FL, 1997
- “Maximization versions of ‘Lights Out’ games in grids and graphs”, Southeastern Conf. on Combinatorics, FL, 1997
- “Fibonacci polynomials and domination in grid graphs”, Southeastern Conf. on Combinatorics, FL, 1998
- “Hall number and multicoloring”, Institute for Mathematics, Budapest, 1998
- “List multicolorings and generalizations of Hall’s theorem”, Institute for Mathematics, Budapest, 1999
- “List multicolorings, flows, and Hall’s theorem”, Technical University, Budapest, 1999.
- “Permanent of a $(0,1)$ -matrix with triangular blocks of zeros”, Comenius Univ., Bratislava, Slovakia, 1999
- “Exact Turan densities for hypergraphs”, Charles Univ., Prague, 1999
- “Parity domination and even dominating sets”, Southeastern Conf. on Combinatorics, FL, 2000
- “Hall multicolorings”, Cumberland Conf. on Combinatorics, AL, 2000
- “Erdos-Ko-Rado with a bound on the maximum degree”, Southeastern Conf. on Combinatorics, Baton Rouge, 2001
- “Erdos-Ko-Rado with restrictions on the minimum complementary degree”, Southeastern Conf. on Combinatorics, FL, 2002
- “Erdos-Ko-Rado and Hilton-Milner generalizations”, Colloq. talk at Howard University, Washington DC, 2002
- “Erdos-Ko-Rado with degree conditions”, Simonovits Conf. on Extremal Graph Theory, Lake Balaton, Hungary, 2003
- “Erdos-Ko-Rado with conditions on the minimum complementary degree”, 19th British Combinatorial Conf., Wales, 2003
- “Erdos-Ko-Rado and Kruskal-Katona theorems”, Colloq. talk at Makerere Univ., Kampala, Uganda, 2004
- “Sperner t-cross-intersecting set systems”, seminar talk at Makerere Univ., Kampala, Uganda, 2004
- “Ramsey’s theorem: order among chaos”, James Aryada Memorial Lecture, Kampala, Uganda, 2004
- “Sperner’s theorem and the Colex order”, Southeastern Conf. on Combinatorics, FL, 2005
- “Generalizations of Sperner’s theorem”, Colloq. talk at Eastern Kentucky Univ., 2005

“Erdos-Ko-Rado and Kruskal-Katona”, seminar talk at Eastern Kentucky Univ., 2005
 “Erdos-Ko-Rado with a bound on the minimum complementary degree”, Brualdifest conference, Madison, WI, 2005
 “Erdos-Ko-Rado with conditions on the minimum complementary degree”, at Watermellon Conference at Carnegie Inst. of Tech., Pittsburgh, 2005
 “Ramsey’s theorem and applications”, Colloq. talk at Oberlin College, Ohio, 2005
 “Generalizations of Sperner’s theorem and the Catalan numbers”, seminar talk At Univ. of Wisconsin, 2005
 “Minimum size maximum antichain in the Colex order”, Hilton retirement Conference, Reading, England, 2006
 “Colex order and a generalization of Sperner’s theorem”, SIAM combinatorics conference, Victoria, Canada, 2006
 “Eternal dominating sets in graphs”, invited talk at BIRS workshop, Banff, Canada, 2007.
 “Colex order, Catalan numbers, and a generalization of Sperner’s theorem”, Colloquium talk at Miami Univ. of Ohio, 2007.
 17 lectures in China in Spring 08. See separate list.
 “Lit-only and regular switching in a graph” Cumberland Conference, Bowling Green, Kentucky, 2009.
 “Lit-only and regular switching with open and closed neighborhoods”, Canadam2009, Montreal, 2009.
 “On the Turan number of $\{123,124,345\}$ ” International Conference on Recent Trends in Graph Theory, Kerela, India, 2010.
 “A Ramsey-type theorem in the hypercube”, Indian Institute of Technology, Mumbai, 2010.
 “The exact value of the Turan number of $\{123,124,345\}$ ”, Indian Institute of Technology, Mumbai, 2010.
 “Vertex Ramsey cliques in the n-cube”, Colloqu. talk at Carnegie Mellon Univ., 2011.
 “Vertex Ramsey problems in the hypercube”, AMS meeting at Wake Forest Univ., 2011.
 “Vertex Turan and Ramsey problems in the hypercube”, Colloq. Talk at Virginia Commonwealth Univ., 2012.
 “Maximum number of copies of a subgraph of the d-cube in the n-cube”, Canadam2013, Newfoundland.
 “Maximum number of copies of a graph in the n-cube”, AMS meeting, Louisville, 2013.
 “Maximum number of induced copies of a graph in the n-cube and Turan forbidden 4-graphs”, AMS sectional meeting, Nashville, 2014.
 “Maximum density of copies of a graph in the n-cube and a Turan surprise”, SUMMIT240, Budapest, 2014
 “Inducibility of graphs in the n-cube and Turan’s theorem”, Colloq. talk at Gebze Institute of Technology, Gebze, Turkey, 2014.
 “A variation of Ryser’s theorem for partial latinized squares” seminar talk at Queen Mary’s Univ., London, 2015.
 “Maximum density of copies of a graph in the n-cube” Colloq. talk at Shanghai Jiaotong Univ., 2015.

“Maximum density of perfect cycles in the n -cube” Colloq. talk at Shanghai Jiaotong Univ., 2015.

“Inducibility of bipartite graphs and d -sequences” Seminar talk at Shanghai Jiaotong Univ. 2015.

“Maximum density of perfect cycles in the n -cube”, Spring Workshop at Shanghai Jiaotong Univ., 2015.

“Maximum density of copies of a graph in the n -cube” Colloq. talk at Tongji Univ., Shanghai, 2015.

“A variation of Ryser’s theorem for partial latinized squares” seminar talk at Tongji Univ., Shanghai, 2015.

“Subgraphs of the n -cube”, Colloq. talk at Jiangnan Univ., Wuxi, China, 2015.

“Maximum density of copies of perfect cycles in the n -cube” Anhui Univ. – Univ. of Science and Technology of China workshop, Hefei, 2015.

“Maximum density of copies of a graph in the n -cube” Colloq. talk at South China Normal University, Guangzhou, China, 2015.

“Maximum density of copies of a graph in the n -cube” Colloq. talk at Beijing Jiaotong Univ., 2015.

“Maximum density of perfect cycles in the n -cube” Colloq talk at Xidian Univ., Xian, China, 2015.

“Maximum density of copies of a graph in the n -cube” Colloq talk at Renmin Univ., Beijing 2015.

“Inducibility of bipartite graphs and d -sequences” Seminar talk at Renmin Univ., Beijing 2015.

“Maximum density of copies of a graph in n -cube” Probabilistic and Extremal Combinatorics Downunder, Monash University, Melbourne, 2016.

“Toggling vertices in a graph and Fibonacci polynomials”, seminar talk at Iowa State Univ., 2016

“Maximum density of copies of vertex configurations in the n -cube”, CanaDAM, Toronto, 2017.

“Polychromatic colorings of the complete graph”, WVU-China Workshop, Morgantown, 2017.

“Polychromatic colorings of complete graphs with respect to 1-regular and 2-regular subgraphs”, AMS Sectional, Buffalo, 2017.

“Polychromatic colorings on the integers”, AMS Sectional, Buffalo, 2017.

“Polychromatic colorings of the integers and Z_n ”, SIAM conference on Discrete Math, Denver, 2018.

“Polychromatic colorings of the integers and Z_n ”, CANADAM2019, Vancouver, 2019.

“Polychromatic colorings of Z and Z_n and not too lonely runners”, AMS Sectional, Madison, WI, 2019.

“Triangular blocks of zeros in a $(0,1)$ -matrix”, Conference of International Linear Algebra Society, Galway, Ireland, 2022.

“One peg in the center and group theory”, Invited talk for undergraduates at St. Olaf College, Minnesota, 2022.

“Polychromatic colorings and codensity of sets of integers”, invited seminar talk at St. Olaf College, Minnesota, 2022.

“Inducibility in the hypercube”, AMS Sectional Atlanta, 2023.

Publication List

- R.Brualdi and J.Goldwasser, Permanent of the Laplacian matrix of trees and bipartite graphs, *Discrete Math* 48(1984), 1-21.
- J.Goldwasser, Permanent of the Laplacian matrix of trees with a given matching, *Discrete Math* 61(1986), 197-212.
- R.Brualdi, J.Goldwasser and S.T.Michael, Maximum permanents of matrices of zeros and ones, *Journal of Combinatorial Theory A*, 47(1988), 207-245.
- J.Goldwasser, Monotonicity of permanents of direct sums of doubly stochastic matrices, *Linear and Multilinear Algebra*, 33(1993), 185-188.
- F.Chung and J.Goldwasser, Integer sets containing no solution to $x+y=3z$, in *The Mathematics of Paul Erdos*, Graham and Nešetřil eds., Springer Verlag, Heidelberg, 1996, 218-227.
- F.Chung and J.Goldwasser, Maximum subsets of $(0,1]$ with no solutions to $x+y=kz$, *Electronic Journal of Combinatorics*, 3(1996)1-23.
- J.Goldwasser and C.Q.Zhang, Permutation graphs and Petersen graph, *Ars Combinatoria*, 113(1996).
- J.Goldwasser and C.Q.Zhang, On minimal counterexamples to a conjecture about unique edge-3-coloring, *Congressus Numerantium* 113(1996), 143-152.
- J.Goldwasser and C.Q.Zhang, Edge-3-coloring of a family of cubic graphs, *Journal of Combinatorial Mathematics and Combinatorial Computing*, 24(1997), 213-224.
- J.Goldwasser, Triangular blocks of zeros in $(0,1)$ -matrices with small permanents, *Linear Algebra and its Applications*, 252(1997), 367-374.
- J.Goldwasser, Shortened and punctured codes and the MacWilliams identities, *Linear Algebra and its Applications*, 253(1997), 1-13.
- J.Goldwasser, W.Klostermeyer and G.Trapp, Characterizing switch-setting problems, *Linear and Multilinear Algebra*, 43(1997), 121-135.
- J.Goldwasser and W.Klostermeyer, Maximization versions of “Lights Out” games in grids and graphs, *Congressus Numerantium* 126(1997), 99-111.
- J.Goldwasser, W.Klostermeyer, M.Mays, and G.Trapp, The density of ones in Pascal’s Rhombus, *Discrete Math* 204(1999), 231-236.
- F.Chung and J.Goldwasser, The maximum upper density of a set of positive real numbers with no solution to $x+y=kz$, Research communications of the conference, “Paul Erdos and his Mathematics”, Budapest, 1999, 54-56.
- J.Goldwasser and C.Q.Zhang, Uniquely edge-3-colorable graphs and snarks, *Graphs and Combinatorics*, Vol. 16, No. 3(2000), 257-267.
- M.Cropper, J.Goldwasser and A.Hilton, The scope of three colouring conjectures, *Journal of Combinatorial Mathematics and Combinatorial Computing* 32(2000), 51-63.
- M.Cropper, J.Goldwasser, A.Hilton, D.Hoffman, and P.Johnson, Extending the disjoint representatives theorems of Hall, Halmos, and Vaughan to list multicolorings of graphs, *Journal of Graph Theory*, Vol. 33, No. 4(2000), 199-219.
- Y.Caro, J.Goldwasser, and W.Klostermeyer, Odd and residue domination numbers of a graph, *Discussiones Mathematicae Graph Theory*, 21(1)(2001), 119-136.
- M.Cropper and J.Goldwasser, Restricted list coloring and Hall’s condition, *Discrete Math* 249(2002), 57-63.
- J.Goldwasser, W.Klostermeyer, G.Trapp and H.Ware, Fibonacci polynomials and parity domination in grid graphs, *Graphs and Combinatorics* 18(2002), 271-283.

- J. Goldwasser and W. Klostermeyer, Nullspace-primes and Fibonacci polynomials, *Fibonacci Quarterly* 40(2002), 323-327.
- J. Goldwasser and W. Klostermeyer, List multicoloring problems, *Bulletin of the Institute of Combinatorics and its Applications*, 34(2002), 71-76.
- M. Cropper and J. Goldwasser, Hall's multicoloring condition and common partial systems of distinct representatives, *J. of Comb. Math. and Comb. Computing* 44(2003), 189-197.
- J. Goldwasser and W. Klostermeyer, Parity dominating sets in grid graphs, *Congressus Numerantium* 172(2005), 79-96.
- J. Goldwasser, Erdos-Ko-Rado with conditions on the minimum complementary degree, *Journal of Combinatorial Theory A* 109(2005), 45-62.
- J. Goldwasser and W. Klostermeyer, Total perfect codes in grid graphs, *Bulletin of the Institute for Combinatorics and its Applications* 46(2006), 61-68.
- J. Goldwasser and W. Klostermeyer, Odd and even dominating sets with open neighborhoods, *Ars Combinatoria* 83(2007), 229-247.
- J. Goldwasser and W. Klostermeyer, Tight bounds for eternal dominating sets in graphs, *Discrete Math* 308(12)(2008), 2589-2593.
- J. Goldwasser and W. Klostermeyer, Maximum orbit weights in the sigma-game and lit only sigma-game on grids and graphs, *Graphs and Combinatorics* 25(2009), 309-326.
- J. Goldwasser, X. Wang and Y. Wu, Does the lit-only restriction make any difference for the sigma-game and sigma-plus game?, *European Journal of Combinatorics* 30(2009), 774-787.
- B. Bobga, J. Goldwasser, A. Hilton and P. Johnson, Completing partial Latin squares: Cropper's Question, *Australasian J. of Combinatorics* 49(2011), 127-152.
- J. Goldwasser, A. Hilton and D. Patterson, Cropper's question and Cruse's theorem about partial Latin squares, *Journal of Combinatorial Designs* 19, no 4(2011), 268-279.
- J. Goldwasser, X. Wang and Y. Wu, Minimum light numbers in the sigma-game and lit-only sigma-game on unicyclic and grid graphs, *Elec. J. of Comb.* 18(1)(2011), p. 214 (27 pages).
- J. Goldwasser and J. Talbot, Vertex Ramsey problems in the hypercube, *Siam J. of Discrete Math* 26-2(2012), 838-853.
- J. Goldwasser and R. Hansen, The exact Turan number of $F(3,3)$ and all extremal configurations, *Siam J. of Discrete Math.* 27-2(2013), 910-917.
- J. Goldwasser, W. Klostermeyer and C. Mynhardt, Eternal protection in grid graphs, *Ars Combinatoria* 91(2013), 47-64.
- J. Goldwasser, A. Hilton, D. Hoffman, S. Ozkan, Hall's theorem and extending partial latinized rectangles, *J. Combinatorial Theory A* 130(2015) 26-41.
- J. Goldwasser, B. Nagle, A. Saez, An extremal problem for finite lattices, *Theory and Applications of Graphs* 3(2016)1 (8 pages).
- J. Goldwasser, T. Peters, M. Young, LIGHTS OUT on Cartesian products, *Electronic Journal of Linear Algebra* 32(2018), 464-474. <https://doi.org/10.13001/1081-3810.3483>
- J. Goldwasser et al., Polychromatic colorings on the hypercube, *Journal of Combinatorics* 9(2018)4, 631-657. <http://arxiv.org/abs/1603.05865>.
- M. Axenovich, J. Goldwasser et al., Polychromatic colorings of complete graphs with respect to 1-,2-factors and Hamiltonian cycles, *Journal of Graph Theory* 87(2018)4, 660-671. <http://arxiv.org/abs/1612.03298>
- J. Goldwasser, A. J. Hilton, J. Zheng, Several families with incomparability and complementarity conditions, *Discrete Appl. Math* 266(2019), 103-110. <https://doi.org/10.1016/j.dam.2019.05.007>

- J.Goldwasser *et.al.*, Polychromatic colorings on the integers, *Integers* 19(2019), #A18.
[arXiv:1704.00042v2](https://arxiv.org/abs/1704.00042v2)
- J.Goldwasser and R.Hansen, Maximum density of vertex-induced perfect cycles and paths in the hypercube, *Discrete Math* 344(11), 112585, 2021. [10.1016/j.disc.2021.112585](https://doi.org/10.1016/j.disc.2021.112585)
- J.Goldwasser and R.Hansen, Polychromatic colorings of 1-regular and 2-regular subgraphs of complete graphs, *Discrete Math* 345(8), 112896, 2022. <https://doi.org/10.1016/j.disc.2022.112896>
- J.Goldwasser *et.al.*, The polychromatic number of small subsets of the integers mod n , *Graphs and Combinatorics* 38, #57, 2022. [arXiv:2007.14468v1](https://arxiv.org/abs/2007.14468v1)
- J.Goldwasser and R.Hansen, Inducibility in the hypercube, *J. of Graph Theory* 105(2023)4.
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