

Brian Curtin

Curriculum Vitae

Department of Mathematics and Statistics, University of South Florida, Tampa, FL 33620
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Education

Doctor of Philosophy in Mathematics. University of Wisconsin, Madison, *August 1996*
Wisconsin. Minor in History of Science.

Thesis advisor: Paul M. Terwilliger.

Bachelor of Arts Degree. Ripon College, Ripon, Wisconsin. Mathematics *May 1991*
and Physics majors, Computer Science minor. Summa Cum Laude.

Research

A central theme of my work is the use of Bose-Mesner and Terwilliger algebras to study association schemes (highly structured combinatorial objects). I study examples which support spin models for link invariants, which have an algebraic self-duality, and which arise from bipartite distance-regular graphs and Latin squares. Leonard pairs and their connections to finite-dimensional representations of certain nice algebras, orthogonal polynomials, and combinatorial objects such as distance-regular graphs comprise a second theme. I also study combinatorial planar algebras, Fibonacci numbers with linear algebra, and power graphs of finite groups.

Employment

Associate Professor. Department of Mathematics, University of *2007–Present*
South Florida.

Assistant Professor. Department of Mathematics, University of South *August 2001–2007*
Florida.

NSF Postdoctoral Fellow. Department of Mathematics, University *August 1998– July*
of California, Berkeley. Researched mathematical problems under the *2001*
auspices of the National Science Foundation.

Adjunct Assistant Professor. Department of Mathematics, Univer- *August 1999–*
sity of California, Berkeley. Taught one upper division undergraduate *Present*
math course each semester: real and complex analysis, linear algebra
(twice).

JSPS Postdoctoral Fellow. Department of Mathematics, Kyushu *August 1996–*
University, Fukuoka, Japan. Researched mathematical problems under *August 1998*
the auspices of the Japan Society for the Promotion of Science.

Research Grants

NSA Young Investigators Award *2003–2005*

Research and Creative Scholarship Grant Program, *2002*
University of South Florida internal grant

USF Faculty Development Grant *2004*

Graduate and Postdoctoral Fellowships

National Science Foundation Postdoctoral Research Fellowship.	1998-2001
Hosted by Vaughn Jones of the University of California–Berkeley.	
Japan Society for the Promotion of Science Postdoctoral Fellowship.	1996–1998
Hosted by Eiichi Bannai at Kyushu University.	
National Science Foundation Graduate Fellowship	1991–1994

Courses Taught

Calculus:

- Engineering Calculus I (Fall 2001; Spring 2007)
- Calculus II (Spring 2002, 2006, 2008, 2010, 2011, 2013)
- Engineering Calculus II (Spring 2005, 2009, 2013, 2015; Fall 2012)
- Engineering Calculus III (Fall 2002, 2013; Spring 2012)
- Calculus III (Spring 2003, 2004; Fall 2007, 2009, 2011)

Upper Division Undergraduate Courses:

- Linear Algebra (Fall 2000, 2013 2014, 2015, 2016; Spring 2001, 2002, 2013, 2014, 2016)
- Elementary Abstract Algebra (Fall 2003, 2004, 2005, 2006; Spring 2015, 2016)
- Elementary Abstract Algebra II (Fall 2015)
- Introduction to Real Analysis (Spring 2000)
- Introduction to Complex Analysis (Fall 1999)
- Mathematical Modeling (Fall 2006, 2008)

Graduate Courses:

- Advanced Linear Algebra (Fall 2014)
- Algebra I (Fall 2002, 2003, 2005, 2007, 2009, 2011, 2013, 2016)
- Algebra II (Spring 2003, 2004, 2006, 2008, 2010, 2012, 2014, 2017)
- Algebraic Graph Theory (Fall 2001, Fall 2012)
- Lie Algebras (Fall 2004)
- Association Schemes (Fall 2008)

Graduate Students

Hasan Alnajjar, Ph.D., Spring 2004. “Tridiagonal pairs in representation theory”.

Now at Jordan University, Aman, Jordan.

Ena Salter, MA, Summer 2005. “Fibonacci vectors”.

Now at Manatee Community College, Sarasota, Florida.

Ibtisam Daqqa, Ph.D., Spring 2008. “The subconstituent algebra of a Latin square”.

Now at Prince Mohammad bin Fahd University, Saudi Arabia.

Jessica Sobkowiak, MA, Summer 2009. “Orbits of Modular Leonard triples”.

Jonathan Spiewak, MA, Spring 2016. “Leonard systems and their friends”.

Refereed Articles Published

- B. Curtin and G.R. Pourgholi, An Euler totien sum inequality. *J. Number Theory* **163** (2016), 101–113.
- B. Curtin, G.R. Pourgholi and H. Yousefi-Azari, On the punctured power graph of a finite group. *Australas. J. Combin.* **62** (2015), 1–7.
- H. Alnajjar and B. Curtin, Leonard triples from the equitable basis of $sl(2)$. *Linear Algebra Appl.* **482** (2015), 47–54.
- B. Curtin and G.R. Pourgholi, A group sum inequality and its application to power graphs. *Bull. Aust. Math. Soc.* **90** (2014), no. 3, 418–426.
- B. Curtin and G.R. Pourgholi, Edge-maximality of power graphs of finite cyclic groups. *J. Algebraic Combin.* **40** (2014), no. 2, 313–330.
- H. Alnajjar and B. Curtin, A bidiagonal and tridiagonal linear map with respect to eigenbases of $sl(2)$. *Linear and Multilinear Algebra* **61** (2013) no. 12, 1668–1674
- B. Curtin, E. Salter and D. Stone, Lucas’ hyperbolas for Fibonacci vectors. *Fibonacci Quarterly* **50** (2012), 51–57.
- H. Alnajjar and B. Curtin, Leonard pairs from the equitable basis of $sl(2)$. *Electronic Journal of Linear Algebra* **20** (2010), 490–505.
- B. Curtin and I. Daqqa, The subconstituent algebra of some strongly regular graphs associated with a Latin square. *Designs, Codes, and Cryptography* **52** (2009), 263–274.
- B. Curtin and I. Daqqa, The subconstituent algebra of a Latin square. *European Journal of Combinatorics* **30** (2009), 447–457.
- B. Curtin, Hyper-duality of Type II Bose-Mesner algebras. *Journal of Applied Algebra and Discrete Structures* **6** (2008), 1–11.
- H. Alnajjar and B. Curtin, A bilinear form for tridiagonal pairs of q -Serre type. *Linear Algebra and its Applications* **428** (2008), 2688–2690.
- B. Curtin, Inheritance of hyper-duality in imprimitive Bose-Mesner algebras. *Discrete Mathematics* **308** (2008), 3003–3017.
- B. Curtin, E. Salter and D. Stone, Some Formulae for the Fibonacci numbers. *Fibonacci Quarterly* **45** (2007), 171–180.
- B. Curtin, Modular Leonard triples. *J. Linear Alg. App.* **424** (2007), 510–539.
- B. Curtin, Spin Leonard pairs. *Ramanujan J.* **13** (2006), 319–332.
- H. Alnajjar and B. Curtin, A family of tridiagonal pairs related to the quantum affine algebra $U_q(sl(2))$. *Electronic J. Linear Alg.* **9** (2005), 1–9.
- B. Curtin, Algebraic characterizations of graph regularity conditions. *Designs, Codes and Cryptography* **34** (2005), 241–248.

- B. Curtin and K. Nomura, 1-Homogeneous, pseudo 1-homogeneous, and 1-thin distance-regular graphs. *J. Combin. Theory Ser. B* **93** (2005), 279–302.
- H. Alnajjar and B. Curtin, A family of tridiagonal pairs. *J. Linear Alg. App.* **390** (2004), 369–384.
- B. Curtin and K. Nomura, Homogeneity of a distance-regular graph which support a spin model. *J. Alg. Combin.* **19** (2004), 257–272.
- B. Curtin, Some planar algebras related to graphs. *Pacific Journal of Mathematics* **209** (2003), 231–248.
- B. Curtin and K. Nomura, Spin models and hyper-self-dual Bose-Mesner algebras. *J. Alg. Combin.* **13** (2001), 173–186.
- B. Curtin, The Terwilliger algebra of a 2-homogeneous bipartite distance-regular graph. *J. Combin. Theory Ser. B.* **81** (2001), 125–141.
- B. Curtin, Almost 2-homogeneous bipartite distance-regular graphs. *European J. Combin.* **21** (2000), 865–876.
- B. Curtin and K. Nomura, Distance-regular graphs related to the quantum enveloping algebra of $sl(2)$. *J. Alg. Combin.* **12** (2000), 25–36.
- B. Curtin, Distance-regular graphs which support a spin model are thin. *Discr. Math.* **197–198** (1999), 205–216.
- B. Curtin and K. Nomura, Some formulas for spin models on distance-regular graphs. *J. Combin. Theory Ser. B* **75** (1999), 206–236.
- B. Curtin, The local structure of a bipartite distance-regular graph. *European J. Combin.* **20** (1999), 739–758.
- B. Curtin, Bipartite distance-regular graphs, part I. *Graphs Combin.* **15** (1999), 143–158.
- B. Curtin, Bipartite distance-regular graphs, part II. *Graphs Combin.* **15** (1999), 377–391.
- B. Curtin, 2-Homogeneous bipartite distance-regular graphs. *Discr. Math.* **187** (1998), 39–70.

Presentations

- Invited: “Bidirected edge-maximality of power graphs of finite cyclic groups”, Modern trends in Algebraic Graph Theory, Villanova University. *June 5, 2014*
- Invited: “Edge-maximality of power graphs of finite cyclic groups”, AMS Sectional, Knoxville, Tennessee. *March 23, 2014*
- Invited: “Permutations from Latin Squares”, 2013 MAA-FL Meeting, University of Tampa. *February 22, 2013*
- Invited: “Terwilliger algebras of Bol loops”, AMS Sectional, Lincoln, Nebraska. *October 15, 2011*

- Colloquium: “The Terwilliger algebra of a Latin square”, National Chiao Tung University, Hsinchu, Taiwan. *October 6, 2009*
- Invited: “Leonard pairs associated with sl_2 ”, AMS Sectional, Worcester Polytechnical Institute. *April 26, 2009*
- “Spin Leonard pairs”, Knotting Mathematics and Art: International conference in low dimensional topology and Mathematical Art, University of South Florida. *November 4, 2007*
- Invited: “Leonard Triples”, AMS Sectional, Chicago Illinois. *October 6, 2007*
- “Isomorphisms and homomorphisms of graphs”, Algebraic Combinatorics, An International Conference in Honor of Eiichi Bannai's 60th Birthday, Sendai, Japan. *June 30, 2006*
- Invited (Colloquium): “Bose-Mesner algebras”, Kent State University. *February 9, 2006*
- Invited: “Duality of Bose-Mesner algebras”, AMS Sectional, Lincoln Nebraska. *October 22, 2005*
- Invited: “Modular Leonard triples of Bannai-Ito type”, AMS Sectional, Bard College, New York. *October 9, 2005*
- “Hyper-self-duality of Hamming and Doob graphs”, Geometric and Algebraic Combinatorics 3, Oisterwijk, The Netherlands. *August 16, 2005*
- “Bose-Mesner algebras, spin models, and planar algebras”, Subfactors Seminar, Vanderbilt University. *March 29, 2005*
- Invited: “Hyper-dual pairs of Bose-Mesner algebras”, Com²MaC Conference on Association schemes, Codes, and Designs, Pusan National University, Busan, Korea. *July 24, 2004*
- Invited: “Modular Leonard triples”, AMS sectional, Chapel Hill, NC. *October 24, 2003*
- Invited: “Modular Leonard triples”, International workshop on special functions, orthogonal polynomials, quantum groups, and related topics, Bexbach, Germany. *October 19, 2003*
- “Automorphisms and homomorphisms of graphs.”, Combinatorics Seminar, University of Florida. *February 18, 2003*
- Invited: “Planar algebras generated by graphs.”, AMS sectional, Orlando, FL. *November 10, 2002*
- “1-Homogeneous, pseudo 1-homogeneous, and 1-thin distance-regular graphs.”, Geometric and Algebraic Combinatorics 2, Oisterwijk, The Netherlands. *August 15, 2002*
- “Graph automorphisms and homomorphisms.”, Combinatorics Seminar, University of Wisconsin–Madison. *October 27, 2001*
- “Some planar algebras generated by graphs”, Formal Power Series and Algebraic Combinatorics, Tempe, Arizona. *May 27, 2001*
- Invited (Colloquium): “Bose-Mesner algebras.”, University of South Florida. *March 2, 2001*

- Invited (Colloquium): “Bose-Mesner algebras.”, Texas A&M . *January 26, 2001*
- “A Planar algebra constructed from the Petersen graph.”, Algebraic Combinatorics, Monster and Vertex Operator Algebras, University of California, Santa Cruz. *July 24, 2000*
- Invited: “Planar algebras related to graphs.”, Com²MaC Conference on Association schemes, Codes, and Designs, Postech, Korea. *July 6, 2000*
- “Highly structured graphs and their algebraic combinatorics.”, Mathematics undergraduate student association lecture, University of California, Berkeley. *September 6, 1999*
- Poster: “Distance-Regular Graphs Related to the Quantum Universal Enveloping Algebra of $sl(2)$.”, Formal Power Series and Algebraic Combinatorics, Barcelona, Spain. *June 10, 1999*
- Poster: “Quantum enveloping algebras and spin models.”, Symposium à la Mémoire de François Jaeger, Grenoble France. *September 2, 1998*
- Invited: “The local structure of a bipartite distance-regular graph.”, Workshop on Distance-regular graphs, National Chiao Tung University, Hsinchu, Taiwan. *June 4, 1998*
- “Quantum enveloping algebras and association schemes.”, Group theory and algebraic combinatorics, RIMS, Kyoto. *March 11, 1998*
- “ $U_q(sl(2))$ and polynomial association schemes.”, Workshop on Jacobi polynomials and Gauss sums, RIMS, Kyoto. *December 2, 1997*
- “Distance-regular graphs with few irreducible T -modules.”, Yamagata, Japan. *November 20, 1997*
- Invited: “ $U_q(sl(2))$ and some spin models on distance-regular graphs.”, 8th Annual Kusatsu Seminar, Kusatsu, Japan. *August 2, 1997*
- “Spin models on distance-regular graphs.”, 14th annual Symposium in Algebraic Combinatorics in Japan, International Christian University, Tokyo, Japan. With K. Nomura *July 15, 1997*
- “Distance-regular graphs which support a spin model are thin.”, British Combinatorial Conference, London. *July 7, 1997*
- “ $U_q(sl(2))$ and some spin models on distance-regular graphs.”, Colloquium, Kanazawa University. *June 11, 1997*
- “2-thin bipartite distance-regular graphs”, Combinatorics seminar, Kyushu University. *June, 1997*
- “Distance-regular graphs which support a spin model are thin.”, Workshop on Distance-regular graphs, National Chiao Tung University, Taiwan. *May 10, 1997*
- “Spin models on distance-regular graphs.”, Workshop on Distance-regular graphs, National Chiao Tung University, Taiwan. *May 9, 1997*

- “The Terwilliger algebra of bipartite spin models.”, National Chiao Tung University, Taiwan. *May 6, 1997*
- “Almost 2-homogeneous bipartite distance-regular graphs.”, National Chiao Tung University, Taiwan. *May 6, 1997*
- “2-Thin bipartite distance-regular graphs.”, Colloquium, National Chiao Tung University, Taiwan. *May 5, 1997*
- “Spin models on distance-regular graphs.”, Seminar, Hokkaido University. *March 6, 1997*
- “Distance-regular graphs which support a spin model are thin.”, Seminar, Osaka Kyoiku University. *February 28, 1997*
- “Spin models on distance-regular graphs.”, Seminar, Osaka Kyoiku University. *February 21, 1997*
- “The combinatorics of the Terwilliger algebra.”, Seminar, International Christian University, Tokyo. *February 18, 1997*
- “Distance-regular graphs which support a spin model are thin.”, Workshop on Coding theory, modular forms, and algebraic combinatorics, Kyushu University. *February 12, 1997*
- “Almost 2-homogeneous bipartite distance-regular graphs.”, Workshop on the Terwilliger algebra of association schemes, RIMS, Kyoto. *December 18, 1996*
- “The Terwilliger algebra of bipartite spin models.”, Group theory and algebraic combinatorics, RIMS, Kyoto. *December 13, 1996*
- “2-thin bipartite distance-regular graphs”, Combinatorics seminar, University of Wisconsin, Madison. *August 18, 1996*
- Poster: “2-Homogeneous bipartite distance-regular graphs.”, Formal Power Series and Algebraic Combinatorics, University of Minnesota. *June 25, 1996*
- “2-homogeneous bipartite distance-regular graphs.”, Conference on Modern Algebra and its Applications, Vanderbilt University. *May 17, 1996*
- “2-Thin bipartite distance-regular graphs.”, University of Waterloo, Canada. *April 15, 1996*
- “A class of bipartite distance-regular graphs.”, Workshop on distance-regular graphs and incidence geometries, RIMS, Kyoto, Japan. *March 9, 1995*
- “2-Thin bipartite distance-regular graphs.”, Algebraic Combinatorics conference, RIMS, Kyoto, Japan. *March 15, 1995*

Seminar Presentations

- “An Euler totient sum inequality”, USF. *November 11, 2015*
- “Edge-maximality of power graphs of finite cyclic groups”, USF. *February 3, 2014*
- “Fibonacci Vectors and Lucas’ Hyperbolas”, USF. *February 20, 2012*
- “Terwilliger algebras of Bol loops”, USF. *September 26, 2011*

- “Leonard pairs of classical type constructed from Lie algebra $\mathfrak{sl}(2)$ ”, USF. *October 19, 2009*
- “A bilinear form for tridiagonal pairs of q -Serre type”, USF. *September 17, 2007*
- “Leonard Triples”, USF. *September 10, 2007*
- “Isomorphisms and Homomorphisms of graphs II”, USF. *October 2, 2006*
- “Isomorphisms and Homomorphisms of graphs I”, USF. *September 25, 2006*
- “Hyper-duality in Bose-Mesner algebras”, USF. *September 16, 2005*
- “Imprimitivity in distance-regular graphs”, USF. *October 12, 2004*
- “Dual aspects of imprimitivity in Bose-Mesner algebras”, USF. *October 19, 2004*
- “Duality in Bose-Mesner algebras I”, USF. *April 16, 2004*
- “Duality in Bose-Mesner algebras II”, USF. *April 23, 2004*
- “Modular Leonard triples as q -analogs of the Pauli matrices”, USF. *November 7, 2003*
- “Modular Leonard triples”, USF. *April 7, 2003*
- “Algebraic characterizations of graph regularity conditions”, USF. *October 14, 2002*
- “A Gentle Introduction to Distance-regular Graphs, I”, USF. *March 4, 2002*
- “A Gentle Introduction to Distance-regular Graphs, II”, USF. *March 18, 2002*
- “Homomorphisms and automorphisms of graphs, I”, USF. *October 25, 2001*
- “Homomorphisms and automorphisms of graphs, II”, USF. *November 14, 2001*
- “Homomorphisms and automorphisms of graphs.”, Combinatorics seminar, University of California, Berkeley. *January 29, 2001*
- “Some planar algebras associated with a graph”, Subfactors seminar, University of California, Berkeley. *May 12, 2001*
- “A Planar algebra constructed from the Petersen graph”, Subfactors seminar, University of California, Berkeley. *January 28, 2000*

Professional Membership and service

American Mathematical Society, since 1991
 Mathematical Association of America, since 1989
 Program Committee, Com2MaC conference 2004
 Session Chair, Com2Mac Workshop on DRGs 2004
 Referee papers for numerous journals

University and Department Service

Graduate Program Director 2016–

CAS Curriculum Committee, 2016–

Discrete Math Search Committee 2016–2017

Midtenure review committee, Department of Biology mathematics program, USFSP, Sp 2016

Florida Consortium of Metropolitan Universities Faculty Learning Community, 2015–2016

School of Natural Sciences and Mathematics Tenure & Promotion Committee, 2015–2017

Linear Algebra textbook selection committee, 2014–2015

Cryptography Search Committee Chair 2014–2015

Mathematics Department Publicity Committee, 2005–2006, 2014–2016

Instructor Search Committee 2010, 2013–2014

Mathematics Department Advisory Committee, 2008–2010, 2012–2014

Mathematics Department Computer Committee, 2003–2005, 2010–2013

Mathematics Department Library Committee, 2002–2003, 2005–2006, 2006–2007, 2009–2010

Mathematics Department Graduate Admissions Committee, 2008–2009

Mathematics Department Graduate Committee, 2007–2008

Reviewer for USF Research Council Internal Awards grant program, Fall 2004, 2005

Spring 2005, 2006, Fall 2007

College of Arts and Sciences FAST faculty input committee, Fall 2002

Algebra Qualifying Exam Committee, 29 times since 2003