

*Curriculum Vitæ*<sup>1</sup>

**Sandra Spiroff**

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**Professional Preparation**

- 2003-2006 Post-doctoral assistant professor, University of Utah,  
Paul C. Roberts, mentor
- 2003 Ph.D. in Mathematics, University of Illinois at Urbana-Champaign  
Dissertation: “The Behavior on the Restriction of Divisor Classes  
to Sequences of Hypersurfaces”; Phillip Griffith, advisor
- 1996 MA in Mathematics, Saint Louis University, St. Louis
- 1991 BS in Mathematics, Indiana University, Bloomington

**Positions**

**Permanent**

- 2022-present Assistant Dean, Graduate School, University of Mississippi
- 2020-present Professor, University of Mississippi, Oxford
- 2013-2020 Associate Professor, University of Mississippi, Oxford
- 2008-2013 Assistant Professor, University of Mississippi, Oxford
- 2006-2008 Assistant Professor, Seattle University, Seattle
- 1992-1994 High School Instructor, Normandy School District, St. Louis

**Post-Doctoral/Visiting/Summer/Temporary**

- 2020-2022 National Science Foundation Program Officer, Alexandria, VA.
- 2016 Summer JNC Professor, Jinan University, Shenzhen, China
- 2014 Fall Visiting Scholar (sabbatical term), University of Utah
- 2014 Summer JNC Professor, Jinan University, Guangzhou, China
- 2011 Summer (SMILE) Visiting Assistant Professor, Louisiana State University
- 2007 Summer Visiting Assistant Professor, University of Nebraska-Lincoln
- 2003-2006 VIGRE and Scott Postdoctoral Assistant Professor, University of Utah
- 2001-2003 GAANN and VIGRE Fellow, University of Illinois, Urbana-Champaign
- 2000-2001 METER/IPLP Research Asst., University of Illinois, Urbana-Champaign
- 1996-2000 Teaching Assistant, University of Illinois, Urbana-Champaign
- 1994-1996 Instructor and Teaching Assistant, Saint Louis University, St. Louis

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<sup>1</sup>Last update: September 29, 2022

## Research Software

Automation of the Hilbert-Kunz multiplicity and  $F$ -signature calculation for intersection algebras, v1, [https://github.com/ElsevierSoftwareX/SOFTX\\_2018\\_153](https://github.com/ElsevierSoftwareX/SOFTX_2018_153)

## Research Publications

- (1) *Powers of graphs and applications to resolutions of powers of monomial ideals*, with S. Cooper, S. El Khoury, S. Faridi, S. Mayes-Tang, S. Morey, and L. Şega, *Research in the Mathematical Sciences*, **9** (2022), no. 2, Paper No. 31, 25 pp.
- (2) *Morse resolutions of powers of square-free monomial ideals of projective dimension one*, with S. Cooper, S. El Khoury, S. Faridi, S. Mayes-Tang, S. Morey, and L. Şega, *J. Algebraic Combinatorics*, **55** (2022), no. 4, 1085-1122.
- (3) *Simplicial resolutions for the second power of square-free monomial ideals*, with S. Cooper, S. El Khoury, S. Faridi, S. Mayes-Tang, S. Morey, and L. Şega, *Women in Commutative Algebra-Proceedings of the 2019 WICA Workshop*, Springer and Association for Women in Mathematics Series, **29**, 193-205.
- (4) *Ladder determinantal rings over normal domains*, with S. Sather-Wagstaff and T. Se, *Communications in Algebra*, **49** (2021), no. 7, 2804-2828.
- (5) *Generic constructions and semidualizing modules*, with S. Sather-Wagstaff and T. Se, *Algebras and Representation Theory*, **24** (2020), no. 4, 1071-1081.
- (6) *On conditionally defined Fibonacci and Lucas sequences and periodicity*, with S. Irby, *Bull. Korean Math. Soc.*, **57** (2020), no. 4, 1033-1048.
- (7) *Semidualizing modules of  $2 \times 2$  ladder determinantal rings*, with S. Sather-Wagstaff and T. Se, *J. Algebra*, **538** (2019) 232-252.
- (8) *Connectedness and Lyubeznik numbers*, with E. Witt and L. Núñez-Betancourt, *International Math Res. Notices*, **2019**, no. 13 (2019) 4233-4259.
- (9) *On semidualizing modules of ladder determinantal rings*, with S. Sather-Wagstaff and T. Se, *Ill. J. of Math.*, **63** (2019), no. 1, 165-191.
- (10) *Automating the calculation of the Hilbert-Kunz multiplicity and  $F$ -signature*, with G. Johnson, *Software X*, **9** (2019) 35-38.
- (11) *Computing the invariants of intersection algebras of principal monomial ideals*, with F. Enescu, *International J. of Alg. & Computation*, **29** (2019), no. 2, 309-332.
- (12) *On the structure of  $S_2$ -ifications of complete local rings*, with S. Sather-Wagstaff, *Rocky Mtn. Math. J.*, **48** (2018), no. 3, 947-965.
- (13) *The tropical semi-ring in higher dimensions*, with J. Norton, *Involve*, **11** (2018), no. 3, 477-488.
- (14) *Torsion in kernels of induced maps on divisor class groups*, with S. Sather-Wagstaff, *J. Alg. Appl.*, **14** (2015), no. 8, 23 pages.
- (15) *On invariants of complete intersections*, *Michigan Math. J.*, **62** (2013) 209-233.
- (16) *The vanishing of a higher codimension analogue of Hochster's theta invariant*, with F. Moore, G. Piepmeyer, and M. E. Walker, *Math. Z.*, **273** (2013), no. 3, 907-920.
- (17) *On zero divisor graphs*, with J. Coykendall, S. Sather-Wagstaff, L. Sheppardson, *Progress in Commutative Algebra 2, Closures, Finiteness and Factorization*, de Gruyter Proceedings in Mathematics 2012, Eds. C. Francisco et al., 241-300.
- (18) *A zero divisor graph determined by equivalence classes of zero divisors*, with C. Wickham, *Comm. in Alg.*, **39** (2011) 2338-2348.

- (19) *Five point zero divisor graphs determined by equivalence classes*, with F. Levidiotis, *Involve*, **4** (2011), no. 1, 53-64.
- (20) *Hochster's theta invariant and the Hodge-Riemann bilinear relations*, with F. Moore, G. Piepmeyer, and M. E. Walker, *Advances in Math.*, **226** (2010), no. 2, 1692-1714.
- (21) *Maps on divisor class groups induced by ring homomorphisms of finite flat dimension*, with S. Sather-Wagstaff, *J. Comm. Alg.*, **1** (2009), no. 3, 567-590.
- (22) *An algebraic proof of the commutativity of intersection with divisors*, with P. Roberts, *J. Algebra*, **320** (2008) 2165-2180.
- (23) *Divisor class groups of graded hypersurfaces*, with A. Singh, *Contemp. Math*, **448** (2007) 237-243.
- (24) *Asymptotic growth of powers of ideals*, with C. Ciuperca and F. Enescu, *Illinois J. Math*, **51** (2007), no. 1, 29-39.
- (25) *Restriction of divisor classes to hypersurfaces in characteristic  $p$* , with P. Griffith, *J. Algebra*, **275** (2004) 801-814.
- (26) *The limiting behavior on the restriction of divisor classes to hypersurfaces*, *J. Pure Appl. Alg.*, **186** (2004) 77-89.

## Grants

### External

- 2019 Conference travel grant: "Women in Commutative Algebra", National Science Foundation, DMS-1934391, \$15,000, PI.
- 2019 "Promoting Diversity in Mathematics in Mississippi", Elsevier Mathematical Sciences Fund: Philanthropy Category, #150, \$4,000 (maximum), PI.
- 2018-2023 "Lyubeznik Numbers & Connectedness and Other Questions", Simons Foundation Research Collaboration Grant, 584932, \$42,000, PI.
- 2012-2017 "An Invariant for Complete Intersections", Simons Foundation Research Collaboration Grant, 245926, \$35,000, PI.
- 2008 "AWM-NSF Mentoring Grant", Association for Women in Mathematics-National Science Foundation, AWM-NSF 192332, \$2,670. (Mark E. Walker, University of Nebraska-Lincoln, Mentor)
- 2006 Conference grant: "Homological Conjectures in Commutative Algebra, A Conference in Honor of Paul C. Roberts' 60th Birthday", Snowbird, UT, National Science Foundation, DMS-0555525, \$20,000 and National Security Agency, H98230-06-1-0091, \$15,000, Co-PI. (Melvin Hochster, University of Michigan, PI)
- 2005 Conference grant: "Commutative Algebra Conference at the University of Illinois Honoring the Contributions of Phillip Griffith", University of Illinois at Urbana-Champaign, Urbana, IL, National Security Agency, H98230-05-1-0268, \$14,712, Co-PI. (Matthew Miller, University of South Carolina, PI)
- 2004 "AWM Travel grant", to attend/present in a special session during the AMS Southeastern Sectional Meeting at Vanderbilt University, Nashville, TN \$500, PI.

### Internal

- 2019 "Office of the Vice Chancellor for Diversity and Community Engagement Funds", University of Mississippi, additional funding solicited and obtained in support of the Elsevier Mathematical Sciences Fund Award #150, \$4000, "PI".

- 2018 “Office of Global Engagement Grant”, University of Mississippi, research partnership with Susan Cooper, University of Manitoba Department of Mathematics, \$3000, PI.
- 2014 “Serre’s  $S_i$  criteria,  $S_2$  graphs, and invariants on rings ”, University of Mississippi, College of Liberal Arts Summer Research Grant, \$7,500, PI.
- 2013 “Non-standard invariants on complete intersection and other questions ”, University of Mississippi, College of Liberal Arts Summer Research Grant, \$7,500, PI.
- 2012 “An Invariant on Complete Intersections, with Applications to Geometry”, University of Mississippi, College of Liberal Arts Summer Research Grant, \$7,500, PI.
- 2010 “Hochster’s Theta Function on Isolated Singularities”, University of Mississippi, College of Liberal Arts Summer Research Grant, \$7,500, PI.
- 2009 “Local Hypersurfaces with Isolated Singularities”, University of Mississippi, College of Liberal Arts Summer Research Grant \$7,500, PI.

### Externally Funded Workshop

- “Cellular Resolutions of Powers of Monomial Ideals” AIM SQuaRE, with S. Cooper (University of Manitoba) S. El Khoury (American University Beirut), S. Faridi (Dalhousie University), S. Morey (Texas State University), and L. Şega (University of Missouri-Kansas City); October 3-7, 2022.
- “Women in (Combinatorial) Commutative Algebra”, Research in Pairs, Mathematisches Forschungsinstitut Oberwolfach, with S. El Khoury (American University Beirut), S. Faridi (Dalhousie University), and L. Şega (University of Missouri-Kansas City); May 15-28, 2022.
- 2019 Workshop: “Women in Commutative Algebra”, Banff International Research Station, 19w5104, co-organized with Karen Smith (University of Michigan); Irena Swanson (Reed College); and Emily Witt (University of Kansas), 42 participants supported October 20-25, 2019.  
<https://www.birs.ca/events/2019/5-day-workshops/19w5104>

### Invited Talks/Presentations (Selected)

#### International

- “Computing the Invariants of Intersection Algebras of Principal Monomial Ideals”, Vietnam-USA Joint Mathematical Meeting, Special Session on Commutative Algebra and Its Interactions with Combinatorics, Quy Nhon, Vietnam, June 2019.
- “Combinatorial Aspects of Intersection Algebras”, Special Session on Computational Commutative Algebra at the Mathematical Congress of the Americas, Montreal, Canada, July 2017.
- “The Tropical Semi-Ring in Higher Dimensions”, Departmental Colloquium, North-West University, Potchefstroom, South Africa, May 2017.
- “Connected Components,  $S_2$ -ifications, and Module Decompositions”, Special Session on Homological and Combinatorial Commutative Algebra at the Joint International Meeting of the European and American Mathematical Societies, in partnership with the Sociedade Portuguesa de Matematica, Porto, Portugal, June 2015.

- “Torsion in Kernels of Induced Maps on Divisor Class Groups”, Special Session on Commutative Algebra at the Joint International Meeting of the Romanian and American Mathematical Societies, in partnership with the Simon Stilow Institute of Mathematics of the Romanian Academy, Alba Iulia, Romania, June 2013.
- “The Vanishing of Invariants on Complete Intersections”, Special Session on Interactions Between Algebraic Geometry and Commutative Algebra at the Summer Meeting of the Canadian Mathematical Society, University of Regina, Regina, Saskatchewan, Canada, June 2012.

### **National/Regional**

- “Calculating Invariants of Intersection Algebras in the Technological Era”, Special Session on Commutative Algebra and Its Environs, University of Hawaii at Manoa, Honolulu, HI, March 2019.
- “Semi-dualizing Modules of Ladder Determinantal Rings, Part I”, Special Session on Commutative Algebra, I, Vanderbilt University, Nashville, TN, April 2018.
- “Intersection Algebras of Noetherian Rings and Their Properties”, Special Session on Commutative Algebra at the 2017 Association for Women in Mathematics (AWM) Research Symposium, April 2017.
- “On the Structure of  $S_2$ -ifications of Complete Local Rings”, Special Session on Factorization Theory and Its Applications at the National Meeting of the American Mathematical Society, San Antonio, TX, January 2015.
- “Expected Dimension Versus Actual Dimension”, Special Session on Commutative Algebra at the Western Meeting of the American Mathematical Society, University of Utah, Salt Lake City, UT, October 2011.
- “Zero Divisor Graphs”, KUMUNU Conference, University of Nebraska-Lincoln, Lincoln, NE, April 2011.

### **Professional Activities**

#### **Research Network Administrator**

2017-2020 Women in Commutative Algebra Research Network Webmaster, co-founder with Emily Witt (University of Kansas); supported by the Association for Women in Mathematics, NSF-HRD 1500481; <https://awmadvance.org/research-networks/wica/>

#### **Conferences Organized**

- 2019 Banff International Research Station Workshop, Alberta, CANADA; co-organized with Karen Smith (University of Michigan), Irena Swanson (Reed College), and Emily Witt (University of Kansas) <https://www.birs.ca/events/2019/5-day-workshops/19w51041>
- 2013 American Mathematical Society Southeastern Sectional Meeting Oxford, Mississippi; co-organized with T. James Reid [http://www.ams.org/meetings/sectional/2207\\_program.html](http://www.ams.org/meetings/sectional/2207_program.html)
- 2006 “Homological conjectures in commutative algebra: A conference in honor of Paul Roberts”, Snowbird, Utah; co-organized with Jean Chan (University of Central Michigan), Mel Hochster (University of Michigan), and Sean Sather-Wagstaff (Kent State University) <http://www.math.utah.edu/~spiroff/paulfest.html>

- 2005 “Commutative Algebra Conference honoring the contributions of Phillip Griffith”, University of Illinois at Urbana-Champaign; co-organized with Andrew Kustin (University of South Carolina), Matt Miller (University of South Carolina), and Anurag Singh (University of Utah)  
<http://www.math.utah.edu/~spiroff/philfest.html>

### **Conferences Attended—to promote minority participation in Mathematics Ph.D programs**

- 2020 Fourth Annual Gulf States Math Alliance Conference, Southern University and A&M College, Baton Rouge, LA  
2018 Cuba TIES IV, La Universidad de Cienfuegos, Cienfuegos, CUBA  
2018 Second Annual Gulf States Math Alliance Conference, Tulane University, New Orleans, LA  
2017 First Annual Gulf States Math Alliance Conference, University of Texas at Arlington, Dallas, TX  
2016 Field of Dreams Conference, Hosted by Washington University, Saint Louis, MO

### **Special Sessions Organized**

- 2019 Special Session of the 2019 Research Symposium of the Association for Women in Mathematics, with Adela Vraciu (University of S. Carolina)  
<https://sites.google.com/site/awmmath/home/RS17/RS19>  
2015 Special Session of the Southeastern Section Meeting of the American Mathematical Society, with Lance Miller (University of Arkansas)  
[http://www.ams.org/meetings/sectional/2226\\_program.html](http://www.ams.org/meetings/sectional/2226_program.html)  
2013 Special Session of the Southeastern Section Meeting of the American Mathematical Society, with Sean Sather-Wagstaff (North Dakota State University)  
[http://www.ams.org/meetings/sectional/2207\\_program.html](http://www.ams.org/meetings/sectional/2207_program.html)  
2011 Special Session of the National Meeting of the American Mathematical Society, with Paul C. Roberts (University of Utah) and Anurag Singh (University of Utah)  
<http://www.ams.org/meetings>  
2009 Special Session of the Central Section Meeting of the American Mathematical Society, with Florian Enescu (Georgia State University)  
[http://www.ams.org/meetings/sectional/2152\\_program.html](http://www.ams.org/meetings/sectional/2152_program.html)

### Other Professional Activities

- 2018 Cuba Ties participant/recruiter, with UM group
- 2015 Recruitment team member for the University's Chinese initiative, as invited by Nosa Egiebor, the Senior International Officer and Executive Director for Global Engagement
- 2012 Departmental (co) Reviewer, with Don Cole, at University of Arkansas-Pine Bluff Mathematics Department
- 2009-2013 Math Reviews Reviewer
- 2008-2013 Zentralblatt MATH Reviewer
- 2004-2006 Commutative Algebra Seminar Organizer, University of Utah

### Honors

- 2015-2018 Phi Beta Kappa Outstanding Chapter, University of Mississippi
- 2010 Frist Faculty/Staff Award Nominee, University of Mississippi
- 2007 IMMERSE Fellowship, University of Nebraska-Lincoln
- 2002 VIGRE Fellowship, U. of Illinois at Urbana-Champaign (UIUC)
- 2001 GAANN Fellowship, UIUC
- 2000 METER/IPLP Research Fellowship, UIUC
- 2000 Mathematics Teaching Award, UIUC
- 2000 Incomplete List of Teachers Ranked as Excellent by Their Students, University of Illinois at Urbana-Champaign
- 1994-1996 Presidential Fellowship, Saint Louis University, St. Louis
- 1990 Phi Beta Kappa, Indiana University, Bloomington

### Service Activities

- 2019-2020 External Academic Affairs Committee, University of Mississippi (UM)
- 2019-2020 Completion and Student Success Committee, UM
- 2019-2020 QEP Advisory Board Member, UM
- 2017-2020 Sabbatical Leave Review Committee, UM
- 2016-2020 Strategic Planning Council, UM
- 2018-2020 Phi Beta Kappa President, UM
- 2016-present National & Gulf States Math Alliance Member
- 2016-2018 Phi Beta Kappa Vice President, UM
- 2013-2020 AMS Grad. Student Chapter Advisor/Co-founder, UM
- 2015 UM China Initiative Recruitment Team (Beijing, Tianjin)
- 2013-2016 Phi Beta Kappa Committee on Members in Course, UM
- 2013 House Calls Faculty Visitor, UM
- 2012-2013 Departmental Plus/Minus Grading Committee, UM
- 2011-2013 Calculus Committee, UM
- 2011-2013 Liaison to Louisiana State University for SMILE program, UM
- 2012 Representative at Mississippi School for Math & Science Visit Day, UM
- 2010, 2012 Representative at Junior Visit Day, UM
- 2010 Representative at Spring Visit Day, UM

2008-2013 GAANN Committee, UM  
2008-2011 Representative at the Majors Fair, UM  
2009-2011 Algebra Committee, UM  
2008-2016 Teacher Education Committee, UM  
2007-2008 Departmental Webmaster, Seattle University  
2006 Rocky Mountain Math. Consortium Representative, University of Utah  
2004-2006 Phi Beta Kappa of Utah Vice President, University of Utah  
2002 Capricious Grading Committee, U. Illinois at Urbana-Champaign (UIUC)  
2002 Computer Steering Committee, UIUC  
2001 Teaching Awards Chairperson, UIUC

### **Service Publications**

Article in *The Key Reporter*, a quarterly journal of the national honor society Phi Beta Kappa, Winter 2017-2018 edition, detailing aspects of the University of Mississippi Chapter.

### **Memberships**

American Mathematical Society  
Association for Women in Mathematics  
Phi Beta Kappa

### **Post-docs**

Tony Se, 2016-2019 (Ph.D from University of Kansas in 2016 under the direction of Hailong Dao)

### **Graduate Students (Selected)**

Ph. D. Prosp/Diss Committee, Mathias Muia, University of Mississippi  
Masters Oral Committee, Audra Polk, University of Mississippi  
Masters Oral Committee, Phil Kains, University of Mississippi  
Masters Oral Committee, Haley Payne, University of Mississippi  
Masters Oral Committee, Christy Hart, University of Mississippi  
Ph. D. Prosp/Diss Committee, Tommy Naugle, University of Mississippi  
Masters Oral Committee, Courtney Stubbs, University of Mississippi  
Masters Oral Committee, Anastasiia Minenkova, University of Mississippi  
Ph. D. Prosp/Diss Committee, Stephan Roberts, University of Mississippi  
Masters Oral Committee, Adrienne Gispén, University of Mississippi  
Masters Oral Committee, Kenna Collums, University of Mississippi  
Masters Oral Committee, Travis Dirlé, University of Mississippi  
Ph. D. Dissertation Committee, Chris Schwanke, University of Mississippi  
Masters Oral Committee, Milisha Hart, University of Mississippi  
Masters Oral Committee, Keshan Zeleski, University of Mississippi  
Masters Oral Committee, Dan Chausse, University of Mississippi

Masters Oral Committee, Wesley Henry, University of Mississippi  
Masters Oral Committee, Mary Margaret Rich, University of Mississippi  
Masters Oral Committee, Thomas Koslowski, University of Mississippi  
Masters Oral Committee, Kelvin Holmes, University of Mississippi  
Masters Thesis Advisor, Amanda Acosta, University of Mississippi  
Masters Thesis Committee, Michael Azlin, University of Mississippi  
Masters Thesis Committee, Catherine Putnam, University of Mississippi  
Masters Oral Committee, James Henegan, University of Mississippi  
Masters Oral Committee, Janet Nakarmi, University of Mississippi  
Masters Oral Committee, Joy Liao, University of Mississippi  
Masters Oral Committee, Bradley Farrow, University of Mississippi  
Masters Oral Committee, Liangyu Yao, University of Mississippi  
Ph. D. Dissertation Committee, Kazuma Shimomoto, University of Utah  
Masters Oral Committee, Drew Butcher, University of Utah

### **Undergraduate Students**

Honors Thesis Advisor, Skylyn Irby, University of Mississippi  
Honors Thesis Advisor, Gabriel Johnson, University of Mississippi  
Honors Thesis Advisor, John Norton, University of Mississippi  
Honors Thesis Committee, Jonathan Broom, University of Mississippi  
Honors Thesis Advisor, Kenna Collums, University of Mississippi  
Honors Thesis Advisor, Florida Levidiotis, University of Mississippi  
Undergraduate Research, Justin Williams, Seattle University  
Undergraduate Research, Timothy Simmons, University of Utah