

Curriculum Vitae

Russ Woodrooffe

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Personal information: US citizen.

Research interests

Geometric and topological combinatorics,
group theory, subgroup lattices,
commutative algebra (face rings and edge ideals).

Education

- PhD, 2005, Cornell University, mathematics. (Advisor [Kenneth S. Brown.](#))
- MS, 2002, Cornell University, mathematics.
- BS, 1998, University of Michigan, mathematics and computer science, honors in both.

Academic experience

- University of Primorska (Associate Professor) Oct 2017 –
- Mississippi State University (Assistant Professor) Aug 2012 – Aug 2017
- Washington University in St. Louis
 - William Chauvenet Postdoctoral Lecturer Sep 2008 – May 2012
 - Visiting Research Scholar Jan 2008 – Aug 2008
- Weill Cornell Medical College in Qatar
 - Lecturer Aug 2006 – Dec 2007
 - Academic Assistant Aug 2005 – May 2006

Grants

- Foreign PI on Slovenian Research Agency (ARRS) bilateral project grant, with Dragan Stevanović as PI. Award amount 1785 eur / year. (2015 – 2016)

Honors and awards

- Guido L. Weiss Teaching and Service Award from Washington University in St. Louis Department of Mathematics (Spring 2011).

Papers and preprints (see <https://osebje.famnit.upr.si/~russ.woodrooffe/research.html>)h-index: 8 i10-index: 8 (both according to [Google Scholar](#))

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17. John Shareshian and Russ Woodrooffe, *Divisibility of binomial coefficients and generation of alternating groups*, Pacific J. Math. **292** (2018), no. 1, 223–238, [arXiv:1505.05143](#).
 16. Alireza Abdollahi, Russ Woodrooffe, and Gjergji Zaimi, *Frankl's Conjecture for subgroup lattices*, Electron. J. Combin. **24** (2017), no. 3, Paper 25, 9 pages, [arXiv:1606.00011](#).
 15. Jay Schweig and Russ Woodrooffe, *A broad class of shellable lattices*, Adv. Math. **313** (2017), 537–563, [arXiv:1604.03115](#).
 14. John Shareshian and Russ Woodrooffe, *Order complexes of coset posets of finite groups are not contractible*, Adv. Math. **291** (2016), 758–773, [arXiv:1406.6067](#).
 13. Huy Tài Hà and Russ Woodrooffe, *Results on the regularity of square-free monomial ideals*, Adv. Appl. Math. **58** (2014), 21–36, [arXiv:1301.6779](#). (A corrigendum to Lemma 3.4 of the paper appears in Adv. Appl. Math. **86** (2017), 175–177.)
 12. Russ Woodrooffe, *Matchings, coverings, and Castelnuovo-Mumford regularity*, J. Comput. Algebra **6** (2014), no. 2, 287–304, [arXiv:1009.2756](#).
 11. Stephan Foldes and Russ Woodrooffe, *Antichain cutsets of strongly connected posets*, Order **30** (2013), no. 2, 351–361, [arXiv:1109.5705](#).
 10. Russ Woodrooffe, *Chains of modular elements and shellability*, J. Combin. Theory Ser. A **119** (2012), no. 6, 1315–1327, [arXiv:1104.0936](#).
 9. John Shareshian and Russ Woodrooffe, *A new subgroup lattice characterization of finite solvable groups*, J. Algebra **351** (2012), no. 1, 448–458, [arXiv:1011.2503](#).
 8. Russ Woodrooffe, *Chordal and sequentially Cohen-Macaulay clutters*, Electron. J. Combin. **18** (2011), no. 1, Paper 208, 20 pages, [arXiv:0911.4697](#).
 7. ———, *Erdős-Ko-Rado theorems for simplicial complexes*, J. Combin. Theory Ser. A **118** (2011), no. 4, 1218–1227, [arXiv:1001.0313](#).
 6. ———, *Vertex decomposable graphs and obstructions to shellability*, Proc. Amer. Math. Soc. **137** (2009), no. 10, 3235–3246, [arXiv:0810.0311](#).
 5. ———, *Cubical convex ear decompositions*, Electron. J. Combin. **16** (2009), no. 2, Research Paper 17, approx. 33 pp. (electronic), [arXiv:0709.2793](#).
 4. ———, *An EL-labeling of the subgroup lattice*, Proc. Amer. Math. Soc. **136** (2008), no. 11, 3795–3801, [arXiv:0708.3539](#).
 3. ———, *Shelling the coset poset*, J. Combin. Theory Ser. A **114** (2007), no. 4, 733–746, [arXiv:math/0306346](#).
 2. Alexander Barvinok, Sándor P. Fekete, David S. Johnson, Arie Tamir, Gerhard J. Woeginger, and Russ Woodrooffe, *The geometric maximum traveling salesman problem*, J. ACM **50** (2003), no. 5, 641–664 (electronic), [arXiv:cs/0204024](#).

1. Alexander Barvinok, David S. Johnson, Gerhard J. Woeginger, and Russ Woodrooffe, *The maximum traveling salesman problem under polyhedral norms*, Integer programming and combinatorial optimization (Houston, TX, 1998), Lecture Notes in Comput. Sci., vol. 1412, Springer, Berlin, 1998, 195–201.

Other research products

- The On-Line Encyclopedia of Integer Sequences (2015), [Sequence A258577](#).
Numbers n with greatest prime power divisor p^a , s.t. $\gcd\{\binom{n}{k} : 1 \leq k \leq n-1, \binom{n}{k} \text{ is not divisible by } p\} < 1$.
- Russ Woodrooffe, *Gap.app – a native Macintosh GUI for GAP*, Version 0.22.
(<http://cocoagap.sourceforge.net/>).

Research talks

- *Non-contractibility and non-acyclicity of coset lattices*: National Autonomous University of Mexico (UNAM), Morelia (Jan 2018).
- *The story of a computation; The story of a figure; Using make in unexpected ways* (3 short talks, invited): Software Tools For Mathematics (Jan 2018).
- *Order congruence lattices have convex ear decompositions*: 2017 CMS Winter Meeting (Dec 2017).
- *Non-acyclicity of coset lattices and generation of finite groups*: Fall 2017 AMS Central Sectional Meeting (Sep 2017), SIAM Conference on Applied Algebraic Geometry (Aug 2017).
- *Arrangements and the independence polynomial*: University of Primorska (May 2017), Spring 2017 AMS Central Sectional Meeting (Apr 2017).
- *A broad class of shellable lattices*: New Mexico State University **Colloquium** (Feb 2017), Algebraic Combinatorics and Group Actions (Jul 2016), SUNY Binghamton (May 2016), Spring 2016 AMS Southeastern Sectional Meeting (Mar 2016), University of Miami (Feb 2016).
- *Frankl's Conjecture for subgroup lattices*: Special Section at 2017 Joint Mathematics Meetings (Jan 2017), University of Ljubljana (May 2016).
- *Comodernistic lattices: a lattice-theoretic analogue of solvable groups*: Groups in Florence (Jun 2016).
- *Order congruence lattices are shellable / A broad class of shellable lattices*: Special Section at 2016 Joint Mathematics Meetings (Jan 2016).
- *Lattice labelings and modular elements*: University of Primorska (Dec 2015).
- *Unimodal f -vectors and h -vectors of trees*: University of Ljubljana (Dec 2015), University of Mississippi (Oct 2015), Fall 2015 AMS Central Sectional Meeting (Oct 2015).

- *Order congruence lattices are CL-shellable*: 8th Slovenian Conference on Graph Theory (Jun 2015).
- *On an analogue of Kummer's Theorem for the number of equipartitions*: 2015 International Conference in Graph Theory at the University of Primorska, Slovenia **Invited hour-long talk** (May 2015).
- *Divisibility questions for alternating groups and for binomial coefficients*: University of Padua (May 2015).
- *Topology and combinatorics of subgroup and coset lattices*: University of Georgia (Apr 2015).
- *Several divisibility questions from group theory and combinatorics* (poster): IMA Workshop on Geometric and Enumerative Combinatorics (Nov 2014).
- *Coset lattices are noncontractible, even for groups with alternating factors*: Fall 2014 AMS Western Sectional Meeting (Oct 2014).
- *Some topological combinatorics for combinatorial algebraists*: a series of 4 lectures in the 2014 Atlantic Association for Research in the Mathematical Sciences (AARMS) Summer School in Commutative Algebra at Dalhousie University (Aug 2014).
- *Noncontractibility of the coset lattice and fixed points of group actions*: Dalhousie University **Colloquium** (Aug 2014), University of Primorska (Jun 2014).
- *Regularity: a homological measure of graph complexity*: International Conference on Graph Theory and Combinatorics in Rogla, Slovenia (May 2014).
- *Why coset lattices involving A_{15} are non-contractible*: Spring 2014 AMS Southeastern Sectional Meeting (Mar 2014).
- *Inclusion-exclusion and the coset lattice*: Oklahoma State University (Mar 2014).
- *An absence of leaves in regularity*: Fall 2013 AMS Eastern Sectional Meeting (Oct 2013), 2013 CMS Summer Meeting (Jun 2013).
- *Several lattices on groups*: Miskolc Discrete Mathematics Roundtable Workshop (Jun 2013).
- *On inclusion-exclusion in the subgroup and coset lattice*: 26th Cumberland Conference on Combinatorics, Graph Theory, and Computing (May 2013).
- *Homology cycles in the coset posets of certain finite groups*: Spring 2013 AMS Southeastern Sectional Meeting (Mar 2013).
- *Regularity of clutters with collages*: Fall 2012 AMS Southeastern Sectional Meeting (Oct 2012).
- *Modular and maximal chains in the subgroup lattice of a finite group*: Conference on Universal Algebra and Lattice Theory (Jun 2012).

- *Noncontractibility of the coset lattice of a finite group*: Spring 2012 AMS Central Sectional Meeting (Mar 2012).
- *Shellability and its obstructions*: St. Louis University **Colloquium** (Feb 2012).
- *Topology of subgroup lattices*: Mississippi State University **Colloquium** (Feb 2012).
- *Lexicographic labelings of posets and subgroup lattices*: University of Miskolc **Colloquium** (Dec 2011).
- *Antichain cutsets of strongly connected posets*: Workshop on Algebraic Topology and Combinatorics in Buenos Aires (Nov 2011).
- *Erdős-Ko-Rado theorems on simplicial complexes*: Turán Memorial Conference (Aug 2011), University of Illinois at Urbana-Champaign (Mar 2011), Budapest Semesters in Mathematics Reunion Conference (Jun 2010), 23rd Cumberland Conference on Combinatorics, Graph Theory, and Computing (May 2010), Spring 2010 AMS Southeastern Sectional Meeting (Mar 2010).
- *Chains of modular elements and shellability*: University of Bremen (Jul 2011), Fall 2010 AMS Central Sectional Meeting (Nov 2010).
- *Polytopes in subgroup and coset lattices*: Rocky Mountain Mathematics Consortium Summer School on Polyhedral Combinatorics and Algebraic Combinatorics (Jun 2011).
- *Matchings, coverings, and Castelnuovo-Mumford regularity*: Cumberland Conference on Combinatorics, Graph Theory, and Computing (May 2011), University of Kansas (May 2011), Dalhousie University (Mar 2011), Tulane University (Jan 2011), 2010 CMS Winter Meeting (Dec 2010).
- *Minimax chains and topology of the subgroup lattice*: University of Kansas (May 2011), University of Idaho (Apr 2011), Dalhousie University **Colloquium** (Mar 2011), Approaches to Group Theory Conference (Oct 2010).
- *Chordal and k -decomposable clutters*: University of Illinois at Urbana-Champaign (Mar 2011), Fall 2010 AMS Eastern Sectional Meeting **45 min talk** (Oct 2010), Cornell University (Nov 2009); also presented as a poster at IPAM Workshop on Combinatorial Geometry (Oct 2009).
- *Vertex decomposable graphs*: Fall 2009 AMS Eastern Sectional Meeting (Oct 2009), St. Louis University (Mar 2009).
- *Gap.app demonstration*: Groups and Computation V Conference (Mar 2008).
- *An EL -shelling of the subgroup lattice*: Alfréd Rényi Institute of Mathematics (Jun 2008), St. Louis University (Apr 2008), Bilkent University (Apr 2008), Summer School on Algebra and Combinatorics in Lisbon (Jun 2007).
- *Groups, posets, and shellings*: American University of Sharjah (Apr 2006), American University in Cairo (Mar 2006), Qatar University (Mar 2006), Budapest Semesters in Mathematics Reunion Conference (Jun 2005).

Research advising (see <https://osebje.famnit.upr.si/~russ.woodrooffe/advising.html>)**Graduate:**

- Directing PhD thesis of Andrés Santamaría Galvis (Fall 2017 -).
- Directed masters project of Lee Hathcock, *Relaxations of the weakly chordal condition in graphs* (Summer 2016 – Summer 2017).
- Advised research visit of Alper Ülker, a PhD student at Ege University who received a year-long Visiting Scholar grant from the Council of Higher Education of Turkey to work with me at Mississippi State University (Spring 2014 – Fall 2014).
- Directed masters project of Bonnie Sessions: *EL-labelings of colored graph posets and exponential structures* (Spring 2013).

Undergraduate:

- Directed undergraduate research project of Ethan Brockman: *Independence polynomials of claw-free graphs and trees* (Fall 2015).
- Directed undergraduate research project of Bailey Swinford: *Divisibility of binomial coefficients at $p = 2$* (Fall 2015).
- Directed undergraduate research project of Joshua Dean: *Homology using linear algebra* (Spring 2014).
- Directed honors thesis project of Yoni Marshall: *Ramsey theory: from finite to infinite* (Spring 2011).

Mathematical outreach (see <https://osebje.famnit.upr.si/~russ.woodrooffe/outreach.html>)

- Math Club talk for undergraduates: *The probability of generating a group*, Rhodes College (Apr 2017), Mississippi State University (Jan 2017).
- Public talk at outreach event “The Talk: Promoting STEM In Youth”: *Prime divisibility of binomial coefficients*, Tupelo MS (Nov 2016).
- Math Club talk for undergraduates: *How to type Mathematics in LyX*, Mississippi State University (Sep 2016, Sep 2014), University of Primorska (May 2014).
- Math Club talk for undergraduates: *Small, large, and typical gaps between primes*, Mississippi State University (Sep 2015).
- Math Club talk for undergraduates: *A conjecture on divisibility of binomial coefficients*, University of Primorska (May 2014), Rhodes College (Jan 2014), Mississippi State University (Apr 2013).
- Math Circle activities for middle and high school students: *Nonplatonic polyhedra*, Ferguson Middle School (Sep 2011), Washington University in St. Louis (Sep 2011, Oct 2009).
- Math Circle activities for middle and high school students: *Graph theory*, Washington University in St. Louis (Feb 2011, Jan 2009).

- Math Club talk for undergraduates: *Vertex-edge-face numbers of polyhedra*, Washington University in St. Louis (Apr 2010).
- Math Circle for elementary school teachers: *Polyhedra*, Metamorphic Math Center, St. Louis (Mar 2009).
- Math Club talk for pre-medical students: *How big is infinity?*, Weill Cornell Medical College in Qatar (Dec 2007).
- Math Club talk for pre-medical students: *Subsets, counting, and polynomials*, Weill Cornell Medical College in Qatar (Nov 2006).
- Math Club talk for pre-medical students: *The Fibonacci numbers*, Weill Cornell Medical College in Qatar (Oct 2006).

Conference, section, and workshop organization

- Co-organizing (with Ted Dobson, Klavdija Kutnar, Dragan Marušič, and Laura Sheppardson) the “[6th Annual Mississippi Discrete Mathematics Workshop](#)”, planned for Nov 2018 at the University of Mississippi.
- Co-organized (with Ted Dobson, Klavdija Kutnar, Dragan Marušič, and Laura Sheppardson) the “[5th Annual Mississippi Discrete Mathematics Workshop](#)”, held Nov 2017 at the University of Mississippi.
- Co-organized (with Ted Dobson, Klavdija Kutnar, Dragan Marušič, and Laura Sheppardson) the “[4th Annual Mississippi Discrete Mathematics Workshop](#)”, held Nov 2015 at the University of Mississippi.
- Co-organized (with Eric Gottlieb) the [Special Section on Topological Combinatorics](#) at the AMS Fall Southeastern Sectional Meeting, held Oct 2015 at the University of Memphis.
- Co-organized (with Ted Dobson, Klavdija Kutnar, Dragan Marušič, and Laura Sheppardson) the “[3rd Annual Mississippi Discrete Mathematics Workshop](#)”, held Nov 2014 at Mississippi State University.
- Co-organized (with Ted Dobson, Klavdija Kutnar, Dragan Marušič, and Laura Sheppardson) the “[2nd Annual Mississippi Discrete Mathematics Workshop](#)”, held Nov 2013 at Mississippi State University.
- Co-organized (with John Shareshian) the [Special Section on Topological Combinatorics](#) at the AMS Fall Central Sectional Meeting, held Oct 2013 at Washington University in St. Louis.
- Co-organized (with Ted Dobson) an “[Impromptu Combinatorics Workshop](#)”, held Nov 2012 at Mississippi State University.
- Webmaster of [homepage](#) for the conference “Approaches to Group Theory”, held Oct 2010 at Cornell University.

Other service related to mathematics

- Member of Editorial Board, *The Art of Discrete and Applied Mathematics*, 2018 –.
- Organized Algebra/Combinatorics/Topology Seminar at Mississippi State University, Fall 2015, Spring 2017, sporadically in between.
- Co-organized [Mississippi State Math Club](#), Fall 2013 – Spring 2017.
- Organized Top Combo Fun Seminar at Mississippi State University, Fall 2012 – Spring 2015.
- Organized Combinatorics Seminar at Washington University in St. Louis, Fall 2009 – Spring 2012.
- Organized Math Club at Weill Cornell Medical College in Qatar, Fall 2006 and 2007.
- Served as Webmaster for departmental webpage www.math.msstate.edu at Mississippi State University. Significantly redesigned the [news](#) and [seminars](#) sections for better communication, among other updates, Fall 2014 – Spring 2017.
- Contributed several patches to Ly \X mathematical word processor: question environment, improved cases environment, bug-fixes for AMS document classes.
- Refereed for journals: *Ann. Comb.*, *Australas. J. Combin.*, *Combinatorica*, *Discrete Math.*, *European J. Combin.*, *Exp. Math.*, *J. Algebraic Combin.*, *J. Combin. Theory Ser. A*, *J. Pure Appl. Algebra*, *Math. Scand.*, *Math. Slovaca*, *Order*, *Proc. Amer. Math. Soc.*, *Publ. Math. Debrecen*, *Siam J. Discrete Math.*
- Math Reviews reviewer.
- Member of professional organizations: American Mathematical Society, European Mathematical Society, Slovenian Discrete and Applied Mathematics Society.

Non-mathematical service

- Elected as departmental representative for College of Arts & Sciences Faculty Senate, served Fall 2015 – Spring 2017.
- Served as faculty mentor/liaison to a freshman residence hall as part of the Faculty Associates Program at Washington University in St. Louis, 2009 – 2010 academic year.
- Served as discussion leader for Freshman Reading Program at Weill Cornell Medical College in Qatar (Aug 2007) and Washington University in St. Louis (Aug 2009, Aug 2010).
- Served on Committee on Pre-medical Admissions at Weill Cornell Medical College in Qatar, 2006 – 2007 academic year.

Technical skills

- Experienced programmer, with knowledge in GAP, C, C++, Objective C, and various other languages and environments.
- Worked as programmer/computer consultant, 1993-1998.