

Sarah Brauner

CONTACT

University of Minnesota - Twin Cities
Department of Mathematics
Vincent Hall Office 556

braun622@umn.edu
sarahbrauner.com
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EDUCATION

- 2017— **University of Minnesota**
PhD Candidate in Mathematics
Advisor: Vic Reiner
- 2019 M.S. in Mathematics
Major topic: combinatorics and reflection groups
Minor topic: algebraic topology
- 2016-2017 **Smith College**
Post-Baccalaureate Program for Women in Mathematics, GPA: 4.0
- 2012-2016 **Reed College**
B.A. in Mathematics/Economics, GPA: 3.87

RESEARCH INTERESTS

Algebraic combinatorics and its intersection with representation theory, algebraic topology

PUBLICATIONS AND PREPRINTS

4. “Eulerian representations for real reflection groups,” [arXiv:2005.05953](https://arxiv.org/abs/2005.05953), 2020. *Submitted*.
3. (With E. Banaian, H. Chandramouli, K. Klinger-Logan, A. Nadeau and M. Philbin.) “[A Workshop to Build Community and Broaden Participation in Mathematics: Reflections on the Mathematics Project at Minnesota](#),” *PRIMUS* (2021).
2. (With F. Glebe and D. Perkinson) “[Enumerating Linear Systems on Graphs](#),” *Mathematische Zeitschrift* (2020) 296(3): 1101-1134. [arXiv:1906.04768](https://arxiv.org/abs/1906.04768).
1. (With T. Friedmann) “A Simplified Presentation of Specht Modules,” [arXiv:1803.10918](https://arxiv.org/abs/1803.10918), 2018. *Submitted*.

REFEREED CONFERENCE PRECEEDINGS

2. “Eulerian representations for real reflection groups” *Séminaire Lotharingien de Combinatoire* (2021), Formal Power Series and Algebraic Combinatorics (FPSAC), *To appear*. (Talk).
1. (With F. Glebe and D. Perkinson) “[Enumerating Linear Systems on Graphs](#)” *Séminaire Lotharingien de Combinatoire* **82B** (2019), Article # 17. Formal Power Series and Algebraic Combinatorics (FPSAC), Ljubljana, Slovenia. (Poster).

AWARDS AND HONORS

- 2019-2023 NSF Graduate Research Fellowship
 Three year graduate fellowship
- 2017-2023 UMN College of Science and Engineering Graduate Fellowship
 Three year graduate fellowship

2017	UMN School of Mathematics Naresh Jain Fellowship <i>Travel and technology fellowship; \$1500.</i>
2016	Phi Beta Kappa
2016	Reed College Meier Award for Distinguished Thesis in Economics <i>Awarded to 1-2 graduating students annually</i>
2012-2016	Reed College Commendation for Academic Excellence (awarded annually)

GRANTS

2021	MAA Tensor Grant for the Mathematics Project at Minnesota <i>With E. Banaian, M. Philbin, PI Paul Carter; \$6000.</i>
2020	NSA Mathematical Sciences Program for Graduate Student Combinatorics Conference 2021 <i>With E. Banaian, G. Dorpalen-Barry, E. Kelley, E. Stucky, L. Webster, PI Vic Reiner; \$25,000[†].</i>
2020	MAA Tensor Grant for the Mathematics Project at Minnesota <i>With E. Banaian, H. Chandramouli, M. Philbin, PI Paul Carter; \$6000[†].</i>
2019	UMN Campus Climate Grant for the Mathematics Project at Minnesota <i>With E. Banaian, H. Chandramouli, M. Philbin; \$500.</i>
2017	Smith College Summer Research Fellowship Program <i>To conduct research with T. Friedmann; \$4500</i>
2014	Reed College McGill Lawrence Grant <i>To conduct research in South Africa; \$3000</i>

INVITED TALKS

	Eulerian representations for real reflection groups
2021	<i>Women in Combinatorics and Representation Theory</i> UC Riverside Diversity and Excellence Workshop (online)
2020	<i>Arrangements at Home III: Algebraic Aspects</i> Virtual Conference
2020	<i>Graduate Online Combinatorics Colloquium</i>
2020	<i>University of Minnesota Combinatorics Seminar</i> (online)
	Random walks and hyperplane arrangements
2020	<i>Reed College Mathematics Colloquium</i> Reed College, Portland, OR
	Enumerating Linear Systems on Graphs
2019	<i>AMS Central Fall Sectional Meeting: Combinatorial Algebraic Geometry</i> University of Wisconsin, Madison WI
2019	<i>CAGE (Combinatorics, Algebra, and Geometry) Seminar</i> Drexel University, Philadelphia PA
2019	<i>AMS Northeast Spring Sectional Meeting: Chip Firing and Divisor Theory</i> University of Hartford, Hartford CT
2019	<i>Smith College Mathematics Colloquium Lunch Talk</i> Smith College, Northampton MA
	On Specht Modules and the CataLAnKe Theorem
2018	<i>AMS Central Fall Sectional Meeting: Combinatorics in Algebra and Geometry</i> University of Michigan, Ann Arbor MI

[†] Due to COVID-19, both conferences were made virtual and only a portion of the grants were used.

CONTRIBUTED TALKS AND POSTERS

- 2021 **Eulerian representations for real reflection groups** (Talk)
Formal Power Series and Algebraic Combinatorics (FPSAC)
- 2019 **Enumerating Linear Systems on Graphs** (Poster)
Formal Power Series and Algebraic Combinatorics (FPSAC)
Ljubljana, Slovenia
ALGECOM XVI
Loyola University, Chicago, IL
- 2018 **A generalization of the free Lie algebra and its representations** (Talk)
USTARS (Underrepresented Students in Topology and Algebra) Conference
Reed College, Portland OR

TEACHING

- University of Minnesota**
- 2019-2020 TA, Calculus II (year-long course covering introduction to proofs and basic linear algebra) for UMN Talented Youth in Mathematics Program (UMTYMP)
- 2019 TA, UMN REU in Combinatorics
- 2021 Instructor of record for Senior Capstone Project (Maxwell McKinney)
- BEAM (Bridge to Enter Advanced Mathematics)**
- 2021 Junior Faculty: Designed and taught intensive 2-week course on discrete geometry to rising eighth graders
- 2018 Junior Faculty: Designed and taught 6-week course on Logical Reasoning to rising seventh graders
- Smith College**
- 2016-2017 TA in Tutoring Center, Calculus I, II, III and Linear Algebra
- Reed College**
- 2014-2016 TA in Tutoring Center, Calculus I, II, III and Linear Algebra
- 2013-2016 Tutor for Introductory Analysis, Multivariate Calculus, Linear Algebra
- 2016 Grader, Math 382: Algorithms & Data Structures
- 2015-2016 TA and Grader, Microeconomic Theory
- 2013-2014 TA and Grader, Introduction to Economics

ORGANIZING

- 2018 — **Mathematics Project at Minnesota (MPM)**
An annual 4-day workshop for undergraduates from underrepresented groups to increase participation and success in mathematics. As co-organizer I obtain funding, recruit 30+ undergraduate participants and oversee 10-15 graduate student volunteers to plan and implement each workshop session.
- 2020— *Co-organizer* with H. Chandramouli, E. Banaian, M. Philbin
- 2018-2019 *Mentor:* Planned and implemented several workshop sessions
- April 2021 **Graduate Student Combinatorics Conference (GSCC) 2021**
National weekend conference organized by and for graduate students.
Co-organizer with E. Banaian, G. Dorpalen-Barry, E. Kelley, E. Stucky, L. Webster

- 2018-2020 **UMN Math Club**
 Weekly club for undergraduate math majors to build community and foster mathematical curiosity
Co-organizer with M. Avery
- Fall 2019 **Hyperplane arrangement seminar and reading group**
- 2018-2019 **UMN Graduate Student Combinatorics and Algebra Seminar**
Co-organizer with E. Banaian

MENTORING

- 2021— Mentor for Habiba Heshmat, Marie Therese Guerrier, and Mirta Hernandez Carrion
 2020— Research mentor for undergraduate Maxwell McKinney
 Directing research project on combinatorics of McKay-Cartan quivers
 Served as official UMN Senior Capstone Advisor Spring 2021
- 2019— Research mentor for undergraduates Nhung Pham and Annika Christiansen
 Directing research project on chip-firing; paper forthcoming
 Assisted both students in obtaining University funding
- Fall 2018 Directed Reading Project (DRP) course on graph theory with Sophie Perron
- 2018— Mentor for undergraduate math majors through MPM
 Assist with application materials for fellowships, REUs and graduate school
- 2018-2019 Mentor and host for incoming graduate students
- 2017-2019 UMN Women in Science and Engineering Graduate Mentor
 Mentor for UMN undergraduates interested in STEM
- 2013 Reed College International Student Mentor

OUTREACH

- Teacher at Saturday Enrichment for MathCEP, University of Minnesota
- 2019 *Logic Games and Puzzles* (grades 5-6)
- 2018 *Fractals and Chaos* (grades 5-6)
- 2018 *Graph Theory* (grades 7-8)
- 2017 *Cryptology* (grades 5-6)
- 2017-2019 Volunteer math tutor for adults seeking GED, *Franklin Public Library*
- 2016 MathFest Teaching Assistant: Platonic Solids (grades 6-8), *Reed College*
- 2012-2016 Volunteer tutor for low-income youth (grades 9-12), *Friends of the Children*

BIOGRAPHY

- BORN: January 9, 1993 in New York, NY
- CITIZENSHIP: United States