

MurphyKate Montee

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Education

PhD in Mathematics <i>University of Chicago</i>	2020
MA in Mathematics <i>Univeristy of Chicago</i>	2016
MASt in Mathematics <i>University of Cambridge</i>	2014
BS in Mathematics (Honors) and Music <i>University of Notre Dame</i>	2013

Professional Appointments

Carleton College Clare Booth Luce Assistant Professor of Mathematics	2020-present
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Research Interests

Random groups, CAT(0) cube complexes and cubulated groups, Geometric group theory

Awards and Fellowships

Class of '49 Fellowship (for Faculty Development at Carleton)	2022
Clare Boothe Luce Professorship	2021-present
Carleton College Summer Research Circle	2021
Project Next Fellow <i>Selected as member of Brown'20 cohort by Mathematical Association of America</i>	2020
Chicago Center for Teaching Fellow	2019-2020
Graduate Student Leadership Award <i>Awarded by University of Chicago Student Council</i>	2017
Churchill Foundation Fellowship	2014
NSF Graduate Research Fellowship	2013
Alice T Schafer Prize <i>Awarded by Association for Women in Mathematics for excellence in mathematics</i>	2013

Grants

NSF LEAPS-MPS: Cubulation and Property (T) in Random Groups (\$162,975)	2023
AIM SQuaRE: Algebraic and Combinatorial Properties of Skew-adjacency Matrices of Tournaments	2023
Writing Across the Curriculum and Curricular Innovation Grant <i>for developing 'magnetic poetry' style kits for introductory proof writing</i>	2023
Warhol Curatorial Fellowship <i>\$50,000 to develop exhibit titled Inventing the Mathematician: Decolonizing Mathematics</i>	2022
Writing Across the Curriculum and Curricular Innovation Grant <i>\$8000 for summer workshop on pedagogy of writing in math</i>	2022
FaCE Grant <i>\$25,000 for workshop series on Incorporating Race and Social Justice Issues Into Math and CS Curriculum</i>	2022
University of Chicago Women's Board <i>\$30,000 for Women in STEM Symposium</i>	2019
Inclusive Pedagogy Grant <i>\$5,000 from University of Chicago</i>	2019

Research Works in Progress

- [2] Eduard Einstein, Suraj Krishna, MurphyKate Montee, Thomas Ng, and Martin Steenbock. Random quotients of free products of groups. In progress

- [1] Sara Klanderma, MurphyKate Montee, Andrzej Piotrowski, Alex Rice, Bryan Shader, and Xin Tang. Determinants of seidel matrices of tournaments. In progress

Mathematical Research Papers

- [7] ***Lee Li and MurphyKate Montee. Can $(f')^{-1} = (f^{-1})'$? Submitted to *College Mathematics Journal*.
- [6] MurphyKate Montee. Finding Fibonacci in the hyperbolic plane. To appear in *Mathematics Magazine*.
- [5] MurphyKate Montee. Random groups at density $d < 3/14$ act non-trivially by isometries on CAT(0) cube complexes. *Transactions of the AMS*, 376(3):1653–1682, March 2023
- [4] ***Erik Carlson, Willem Fletcher, MurphyKate Montee, Chi Nguyen, Jarne Renders, and Xingyi Zhang. Graphs with many hamiltonian paths. Submitted. arXiv:2106.13372
- [3] MurphyKate Montee. Property (T) in k -gonal random groups. *Glasgow Mathematical Journal*, 64(3):734–738, 2022
- [2] Colin Adams, Thomas Crawford, Benjamin DeMeo, Michael Landry, Alex Tong Lin, Seojung Park, Saraswathi Venkatesh, , and Farrah Yhee. Knot projections with a single multi-crossing. *J. Knot Theory Ramifications*, 24(3):1550011, 30, 2015. With . arXiv:1208.5742
- [1] MurphyKate Montee. Complementary regions of multi-crossing projections of knots. 2015. arXiv:1210.0453

***Indicates publications with undergraduate students.

Related Publications

- [4] *Reading Circle: Trust in Numbers*. With Claudio Gómez-González. Carleton College LTC Blog. April 18, 2020.
- [3] *Applying Teaching Techniques Across Disciplines*. With Brooke McCorkle-Okazaki and Anya Vostinar. Carleton College LTC Blog. April 12, 2020.
- [2] *Mathematics of the Fon People*. With Theresa Helke. Submitted.
- [1] *Inclusive Assessment Practices in STEM*. With Broder, Day-Cooney, et al. Chicago Center for Teaching. 2019.

Research Talks

<i>Cubulation of random quotients of free products</i>	
Cornell University Topology and Geometric Group Theory Seminar	2023
Workshop in Geometric Topology <i>Colorado College</i>	2023
<i>Property (T) and cubulation in random groups</i>	
Technion Geometry and Topology Seminar <i>Haifa, Israel</i>	2022
UW Madison Dynamics Seminar	2022
AWM Research Symposium: Women in Groups, Geometry, and Dynamics <i>U Minnesota</i>	2022
Temple University Geometry and Topology seminar	2022
ENS Group Theory Seminar	2021
CUNY Geometry and Topology Seminar	2021
Beyond Hyperbolicity, <i>OSU</i>	2021
54th Spring Topology and Dynamical Systems Conference	2021

<i>Random groups at density $d < 3/14$ act non-trivially on a CAT(0) cube complex</i>	
University of Notre Dame Geometry and Topology Seminar	2021
Bristol University BRIJES Seminar	2021
Washington University in Saint Louis Geom/Top Seminar	2020
Tufts University Geometry Seminar	2019
University of Illinois at Chicago Geometry Seminar	2019
Young Geometric Group Theory Conference (Contributed) <i>Bilbao, Sp</i>	2019
Three Manifolds and Geometric Group Theory (Contributed) <i>CIRM, Luminy, Fr</i>	2018
Joint Mathematics Meetings, Mathematics Research from the SMALL Undergraduate Research Program	2018

Other Presentations

<i>Panel: Chicago Center for Teaching Fellowships</i> UChicago Center for Teaching	2023
<i>A 'Liberal Arts Laboratory': Teaching with Archives, Maps, and Rare Books</i> with R Bramlett, K Lewis, J Morton, A Sango, T Lamb, Carleton LTC Lunch	2022
<i>Alternative Assessment: A Linear Algebra Case Study</i> UChicago Math Pedagogy Seminar	2022
<i>Object Based Learning with Art and Exhibitions</i> with Sara Cluggish, Carleton LTC Winter Conference	2021

Selected Conferences Attended

Communicating Mathematics <i>Cornell University</i>	2022
Research Experiences for Undergraduate Faculty <i>AIM</i>	2022
Hyperbolic Groups and their Generalizations <i>IHM, Paris, Fr</i>	2022
AWM Research Symposium: Women in Groups, Geometry, and Dynamics <i>U Minnesota</i>	2022
Groups Acting on Fractals <i>CIRM, Luminy, Fr</i>	2022
Beyond Hyperbolicity <i>OSU</i>	2021
54th Spring Topology and Dynamical Systems Conference	2021
Young Geometric Group Theory VIII <i>Bilbao, Sp</i>	2019
Aspects of Non-positive and Negative Curvature in Group Theory <i>CIRM, Luminy, Fr</i>	2019
Graphs, Surfaces, and Cube Complexes <i>Warwick, UK</i>	2018
Joint Mathematics Meetings	2018
Women and Mathematics: Geometry and Randomness in Group Theory <i>IAS</i>	2017
Workshop on Geometric Structure on 3-Manifolds <i>IAS</i>	2015
Chicago Summer School on Topology <i>University of Chicago</i>	2015

Teaching

Instructor of Record

Carleton College

Abstract Algebra <i>Math 342</i>	Sp21, Sp23
Linear Algebra <i>Math 232</i>	F21*, W23*
Calculus 2 <i>Math 120</i>	F20*, W21, W22, F22
Geometric Group Theory <i>Math 395</i>	F22
Geometries <i>Math 244</i>	Sp22
Mathematical Structures <i>Math 236</i>	W21, W22

University of Chicago

Elementary Functions and Calculus I <i>MATH 13100</i>	W19, W20
Elementary Functions and Calculus II <i>MATH 13200</i>	Sp19, Sp20
Linear Algebra <i>MATH 19620</i>	F18
Number Theory (for Secondary Teachers, SESAME Program) <i>MATH50300</i>	W18
Calculus Review Camp <i>Harris School of Public Policy</i>	Sm 17, Sm 18, Sm19
Fundamentals of Teaching Mathematics <i>Chicago Center for Teaching</i>	F19
How To Solve It	F17, F18

Undergraduate Research Advising

Lee Li: <i>Investigating Derivatives of Inverses and Inverses of Derivatives</i>	Sp23
Akash Ganguly, Xingyi Zhang: <i>Petal Permutations of Highly Knotted Unknots</i>	W23, S23
Chi Nguyen, Xingyi Zhang: <i>Minimal Hamiltonian-Connected Graphs</i>	W21
<i>X. Zhang was awarded Honors in Independent Study for this project</i>	
Erik Carlson, Will Fletcher: <i>Hamiltonian Paths in Non-Hamiltonian Graphs</i>	W21, S21

Comps Projects

<i>Using History of Math and Ethnomathematics as a Learning Tool in Higher Education</i>	2022
<i>Geometric Group Theory: Hyperbolic and Automatic Groups and the Word Problem</i>	2021

Undergraduate Directed Readings**University of Chicago Directed Reading Program**

Xingyu Wang: <i>Random Groups and Hyperbolicity</i>	F19
Eric Silva: <i>Riemannian geometry and the Gauss-Bonnet Theorem</i>	Sp16
Eric Silva: <i>Solving the word problem in hyperbolic groups</i>	W16
Jake Koenig: <i>Generating the mapping class group with Dehn twists</i>	F15

University of Chicago Research Experience for Undergraduates

Charlotte Rieder: <i>Finitely generating the mapping class groups with Dehn twists</i>	Sm17
Mary Stelow: <i>Hamiltonicity in Cayley graphs and digraphs of finite abelian groups</i>	Sm17
Can Liu: <i>Ramsey theory</i>	Sm16
Emily Gentles: <i>Simple random walks</i>	Sm16

*Key: F = Fall Term, W = Winter Term, Sp = Spring Term, Sm = Summer Term, * = Two Sections*

Service

Outreach

- Interviewee, Girls Talk Math Summer Program 2023
Spoke with high school girls interested in math; they produced a podcast based on conversation.
- Selection panel, Churchill Foundation Scholarship 2021
- Organizer, Women in STEM Symposium 2019, 2020
Led a team of nine people to organize and run a two-day symposium with 200 attendees. This event was an extension of the Women in MATH symposium I created as Vice-President of UChicago AWM. Fund-raised over \$50,000. Website: <https://voices.uchicago.edu/womeninstem>
- Judge, Science Ambassador Scholarship 2016-2019
Served on selection committee awarding a full scholarship annually to an undergraduate woman in a STEM major, funded by Cards Against Humanity.
- Guest Speaker, Six21 in London, England 2017
Gave a talk and led a workshop on women in mathematics to high-school students at Six21, a sixth form in London, England. Also led problem-solving sessions in individual classes throughout the day.

Professional Service

- Co-Organizer, Racial and Social Justice in Math and CS Curriculum Workshop Series 2022-2023
- Panelist, Undergraduate Research, at Nebraska Conference for Undergraduate Women in Mathematics 2021
- Co-Organizer, Panel on Group Work in Mathematics, run by MAA 2021
- Referee for: Bulletin of the London Mathematical Society, Discrete and Applied Mathematics, Transactions of the AMS

Carleton College

- Member, Advancing the Liberal Arts Taskforce for the College's Strategic Plan 2022
- Member, Budget Committee 2022-present
- Member, Faculty Compensation Committee (Liaison to Budget Committee) 2022-present
- Faculty GeMMS Coordinator (*Gender Minorities in Mathematics and Statistics*) 2020-present
- Sophomore Writing Portfolios Reviewer 2021, 2022

- Member, Student Fellowships Committee 2021-2022
- Speaker, Summer STEM Salon (*Tiling Rectangles with Squares*) 2021
- Co-organizer, Anti-Racism in Mathematics and Statistics Workshop 2021

University of Chicago

- Mentor, Physical Sciences Division Office of Equity, Diversity, and Inclusion 2019-2020
- Creator, Fundamentals of Teaching Mathematics Professional Development Workshop 2019
Planned and facilitated four 90-minute sessions training graduate students in evidence-based pedagogy, specifically in the context of mathematics education. Topics included active learning and constructivism, designing assessments, inclusive teaching practices, and student centered teaching.
- Chapter President, AWM 2018-2019
- Creator, How to Solve It 2017-2018
Created and led a weekly program designed to help undergraduate women develop problem solving and mathematical communication skills.
- Representative, University of Chicago Dean of Students Advisory Committee 2016-2018
- Representative, Departmental Ombudsperson 2016-2018
- Chapter Vice-President, AWM 2016-2018
- Organizer, University of Chicago Women in Math Symposium 2017

Selected Professional Development

- Summer Workshop on Writing in Math Classes 2022
Organizer. With Josh Davis, Claudio Gómez-González, Rafe Jones, Kate Meyer, Steve Scheirer, Caroline Turnage-Butterbaugh
- Teaching Circle (Carleton College LTC) 2022
with Anya Vostinar (CS) and Brooke McCorkle-Okazaki (Music)
- Reading Groups (Carleton College LTC) 2020-2022
Grading for Equity, Cheating Lessons, Data Feminism, Ungrading
- Winter Teaching Workshops (Carleton College LTC) 2020-2021
- Summer Reading Circle (Carleton College LTC)
Trust in Numbers by Theodore Porter, with Claudio Gómez-González
- Student Observer Program (Carleton College LTC) 2021
- Certificate in College Teaching (Chicago Center for Teaching) 2020
Program by Chicago Center for Teaching to help graduate students develop and reflect on their teaching practices; discuss, appraise, and implement pedagogical practices in their own teaching; and receive formative assessment on their teaching. More information at <https://teaching.uchicago.edu/courses-certificates>.
- Institute of Maths Pedagogy Cuddesdon, UK 2019
Intensive four-day conference focusing on visualization and imagery in math pedagogy. Run by Anne Watson and John Mason.
- Individual Teaching Consultation University of Chicago 2019
- Course Design and College Teaching 2017
Term-long class on designing and implementing a plan for teaching a new course as the instructor of record.

Professional Memberships

- Mathematical Association of America (MAA)
- American Mathematical Society (AMS)
- Association for Women in Mathematics (AWM)