

Tyrone Ghaswala

Curriculum Vitae

MC 6252
University of Waterloo
200 University Avenue West
Waterloo, ON, N2L 3G1
Canada
☎ +1 (519) 616 7409
☎ +1 (519) 888 4567 x41588
✉ tghaswal@uwaterloo.ca
🌐 tyjgh.github.io

Appointments

- 2024–present **Assistant Professor Teaching Stream**, *Centre for Education in Mathematics and Computing, University of Waterloo*, Waterloo, Canada
- 2022–present **Adjunct Professor**, *Department of Pure Mathematics, University of Waterloo*, Waterloo, Canada
- 2022–2024 **Lecturer**, *Centre for Education in Mathematics and Computing, University of Waterloo*, Waterloo, Canada
- 2020–2022 **CIRGET Postdoctoral Fellow**, *Université du Québec à Montréal*, Montréal, Canada
- 2018–2019 **PIMS Postdoctoral Fellow**, *University of Manitoba*, Winnipeg, Canada

Education

- 2012–2017 **PhD, Pure Mathematics**, *University of Waterloo*, Waterloo, Canada
The liftable mapping class group
- 2011–2012 **MMath, Pure Mathematics**, *University of Waterloo*, Waterloo, Canada
Intersection Forms on Fermat Hypersurfaces in \mathbb{CP}^3
- 2008–2010 **BSc, Mathematical Physics**, *University of Melbourne*, Parkville, Australia

Papers and Preprints

10. **Rigidity of braid group actions on \mathbb{R} and of low-genus mapping class group actions on S^1** , w Idrissa Ba and Adam Clay, *submitted*
9. **Cofinal elements and fractional Dehn twist coefficients**, w Adam Clay, To appear in *International Mathematics Research Notices*.
8. **Circularly ordering direct products and the obstruction to left-orderability**, w Adam Clay, *Pacific Journal of Mathematics*, 312-2 (2021) 401-419
7. **Homeomorphic subsurfaces and the omnipresent arcs**, w Federica Fanoni and Alan McLeay, *Annales Henri Lebesgue*, 4 (2021) 1565-1593
6. **Promoting circular-orderability to left-orderability**, w Jason Bell and Adam Clay, *Annales de l'institut Fourier*, 71(1) (2021) 175-201
5. **Big Torelli groups: generation and commensurations**, w Javier Aramayona, Autumn E. Kent, Alan McLeay, Jing Tao, and Rebecca R. Winarski, *Groups, Geometry, and Dynamics*, 13(4) (2019) 1373-1399
4. **Free products of circularly ordered groups with amalgamated subgroup**, w Adam Clay, *Journal of the London Mathematical Society* (2), 100 (2019) 775-803
3. **Mapping class groups of covers with boundary and braid group embeddings**, w Alan McLeay, *Algebraic & Geometric Topology*, 20 (2020) 239-278

2. **Lifting homeomorphisms and cyclic branched covers of spheres**, w Rebecca R. Winarski, *Michigan Mathematical Journal*, 66(4) (2017) 885-890
1. **The liftable mapping class group of balanced superelliptic covers**, w Rebecca R. Winarski, *New York Journal of Mathematics*, 23 (2017) 133-164
0. **The liftable mapping class group**, *PhD thesis*, Tyrone Ghaswala (2017). UWSpace. <http://hdl.handle.net/10012/12075>

Talks

Invited Conference Talks

- June 2023 (Plenary) Nearly Carbon Neutral Geometric Topology Conference, Virtual conference
- May 2023 Workshop on Orderable Groups, Centre de recherches mathématique, Montréal
- Dec 2022 Canadian Mathematical Society Winter Meeting, Toronto
- Apr 2022 Graduate Student Topology and Geometry Conference, Georgia Institute of Technology
- Dec 2021 Canadian Mathematical Society Winter Meeting, Virtual conference
- June 2021 Nearly Carbon Neutral Geometric Topology Conference, Virtual conference
- June 2021 Canadian Mathematical Society Summer Meeting, Virtual conference
- June 2020 Nearly Carbon Neutral Geometric Topology Conference, Virtual conference
- Dec 2019 Canadian Mathematical Society Winter Meeting, Toronto
- Sep 2019 Low-dimensional topology program, Université du Québec à Montréal
- June 2019 Ordered Groups and Rigidity in Dynamics and Topology, Casa Matemática Oaxaca, Oaxaca
- June 2019 Canadian Mathematical Society Summer Meeting, Regina, SK
- May 2019 Surfaces of Infinite Type, American Institute of Mathematics, San Jose (short talk)
- Dec 2018 Canadian Mathematical Society Winter Meeting, Vancouver
- Sep 2017 American Mathematical Society Fall Eastern Sectional Meeting, SUNY Buffalo
- May 2017 Braids in Algebra, Geometry and Topology, Edinburgh (lightning talk)
- Dec 2016 Canadian Mathematical Society Winter Meeting, Niagara Falls
- June 2016 Topology Students Workshop, Georgia Institute of Technology
- Mar 2016 Spring Topology and Dynamics Conference, Baylor University

Invited Seminar and Colloquium Talks

- May 2023 UTSC CMS Undergraduate Seminar, University of Toronto Scarborough (virtual)
- May 2023 Phillips Exeter Academy math seminar, Phillips Exeter Academy
- Mar 2023 Hyperbolic Lunch, University of Toronto
- Feb 2023 Geometry and Topology Seminar, McMaster University
- Feb 2023 Geometric Topology Seminar, Columbia University
- Feb 2023 Columbia Undergraduate Mathematics Colloquium, Columbia University
- Nov 2022 Geometry and Topology Seminar, University of Waterloo
- Sep 2022 Topology seminar, University of Wisconsin-Milwaukee (virtual)
- Apr 2022 SAG Seminar, Université de Sherbrooke
- Mar 2022 CIRGET Geometry and Topology Seminar, Université du Québec à Montréal
- Mar 2022 Hyperbolic Geometry Seminar, CUNY (virtual)
- Nov 2021 Geometric Group Theory Seminar, McGill University
- Mar 2021 Australian Geometric Topology Webinar
- Mar 2021 Geometry and Topology Seminar, Georgia Tech

Sep 2020 Max Dehn Seminar, University of Utah
 Jul 2020 Online Geometry Seminar, ETH Zurich
 Feb 2020 Geometric Group Theory Seminar, McGill University
 Jan 2020 CIRGET Geometry and Topology Seminar, Université du Québec à Montréal
 Sep 2019 Geometric Topology Seminar, Columbia University
 Oct 2018 Geometry and Topology Seminar, University of Melbourne
 Oct 2018 Topology Seminar, Monash University
 Sep 2018 Geometry and Topology Seminar, University of Waterloo
 Sep 2018 Geometry and Topology Seminar, McMaster University
 Sep 2018 Algebra Seminar, University of Waterloo
 Sep 2018 Department of Mathematics and Statistics Colloquium, University of Calgary
 Mar 2018 Geometry and Topology Seminar, Brown University
 Mar 2018 Geometric Group Theory and Topology Seminar, Tufts University
 Dec 2017 Geometry and Topology seminar, McMaster University
 Sep 2017 Topology Seminar, University of Michigan
 May 2017 Geometry and Topology Seminar, University of Manchester
 Mar 2017 Geometric Group Theory Seminar, Ohio State University
 Feb 2017 Geometry and Topology Seminar, McMaster University
 Jan 2017 Geometry and Topology Seminar, University of Waterloo
 May 2016 Joint Pure Math and C&O Grad Student Colloquium, University of Waterloo
 Apr 2016 Groups and Combinatorics Seminar, University of Western Australia
 Apr 2016 Geometry and Topology Seminar, University of Sydney
 Apr 2016 Geometry and Topology Seminar, University of Melbourne
 Apr 2016 CARMA Colloquium, University of Newcastle
 Mar 2016 Topology Seminar, Monash University
 Mar 2016 Algebra Seminar, MacMaster University
 Feb 2016 Algebra Seminar, University of Waterloo
 Feb 2015 Pure Math Graduate Student Colloquium, University of Waterloo
 Sep 2012 Pure Math Graduate Student Colloquium, University of Waterloo

Service

Conferences and seminars co-organised

2022 CIRGET Low-dimensional topology working group, Université du Québec à Montréal
 2020-2021 Big Surf(aces) virtual seminar
 2020-2021 CIRGET Low-dimensional topology working group, Université du Québec à Montréal
 2019 63rd Cascade Topology Seminar, University of Manitoba
 2018 Geometry and topology learning seminar, University of Manitoba
 2017 Low-dimensional topology and geometric group theory, CMS Winter meeting special session, University of Waterloo
 2014–2015 Group Presentations learning seminar, University of Waterloo
 2013 Group Cohomology learning seminar, University of Waterloo
 2013 Morse Theory learning seminar, University of Waterloo

- 2013–2015 Joint Pure Mathematics and Combinatorics and Optimization Graduate Student Colloquium, University of Waterloo
- [Mathematical outreach](#)
- Sep 2017 TEDxUofTSalon, Fields Institute, University of Toronto
- Apr 2017 Fields Thesis Competition, University of Toronto (3rd Place)
- Mar 2017 University of Waterloo Three Minute Thesis finals
- Apr 2016 Lunchmaths Seminar, Monash University
- 2012–2016 Math Circles Presenter, CEMC, University of Waterloo
- June 2014 Mathematics Union Seminar, University of Western Australia
- 2010, '11, '13, '23 Australian National Mathematics Summer School
- May 2011 Monday Evening Program, Queen's College, University of Melbourne
- 2008 – present Various high schools across Australia and Canada

[Referee for](#)

Adv. Math., Algebr. Geom. Topol., Bol. Soc. Mat. Mexicana., Canad. J. Math., Groups Geom. Dyn., Houston J. Math., Internat. J. Algebra Comput., Int. Math. Res. Not., Michigan Math. J., New York J. Math., Proc. Cambridge Philos. Soc., Topology Appl.

[Reviewer for](#)

National Science Centre, Poland.

[Other](#)

- 2020– Contest Problem Creator, CEMC, University of Waterloo
- 2014–2016 Graduate Student Representative, Pure Mathematics departmental meetings
- 2012–2016 Math Contest Marker, CEMC, University of Waterloo
- 2014–2015 Chief Returning Officer, University of Waterloo Graduate Student Association
- 2013–2015 Graduate Student Representative, University Committee on Student Appeals, University of Waterloo
- 2012–2015 Pure Mathematics Councillor, University of Waterloo Graduate Student Association Council
- 2012–2015 Activities Committee and Finance Committee member, University of Waterloo Graduate Student Association
- 2013–2014 Deputy Returning Officer, University of Waterloo Graduate Student Association
- 2013–2014 Pure Math Representative, Graduate Student Computing Advisory Committee, University of Waterloo
- 2012–2014 Math Faculty Graduate Student Representative, Senate Graduate and Research Council, University of Waterloo
- 2010 Treasurer, Intercollegiate Council, University of Melbourne residential colleges
- 2010 Arts Representative, Queen's College Sports and Social Club general committee
- 2009–2010 Victorian State Representative, National Association of Australian University Colleges
- 2009 Treasurer, Intercollegiate Activities Committee, University of Melbourne residential colleges

[Supervision](#)

- 2018 USRA **Robert Harris**, *Density of representations of the free group*, (co-supervisor)
- 2024 USRA **Matteus Froese**, *Rigidity of surface braid groups*
- 2024 USRA **Elysia Wang**, *Dehn Nielsen Baer for bounded surfaces*

[Conferences Attended](#)

- Aug 2024 What's your trick?, BIRS, Banff, AB

June 2024 Topology Students Workshop (as a mentor), Nashville TN
 June 2023 Nearly Carbon Neutral Geometric Topology Conference, Virtual conference
 May 2023 Workshop on Orderable Groups, Centre de recherches mathématique, Montréal, QC
 Dec 2022 Canadian Mathematical Society Winter Meeting, Toronto, ON
 Oct 2022 Big Mapping Class Groups and Diffeomorphism Groups, CIRM, Luminy, France
 Aug 2022 Communicating Mathematics, Cornell University, Ithaca, NY
 June 2022 Geometry, Arithmetic, and Groups, UT Austin, Austin, TX
 Apr 2022 Graduate Student Topology and Geometry Conference, Georgia Institute of Technology, Atlanta, GA
 Aug 2021 Summer Surfacing, Virtual conference
 Jul 2021 Tech Topology summer school, Virtual conference
 June 2021 Nearly Carbon Neutral Geometric Topology Conference, Virtual conference
 June 2021 Canadian Mathematical Society Summer Meeting, Virtual conference
 Jul 2020 Topology Postdocs Workshop, Virtual conference
 June 2020 Nearly Carbon Neutral Geometric Topology Conference, Virtual conference
 Dec 2019 Canadian Mathematical Society Winter Meeting, Toronto, ON
 Sep 2019 Program in low-dimensional topology, Université du Québec à Montréal, Montréal, QC
 Sep 2019 63rd Cascade Topology Seminar, University of Manitoba, Winnipeg, MB
 June 2019 Ordered Groups and Rigidity in Dynamics and Topology, Casa Matemática Oaxaca, Oaxaca, MX
 June 2019 Canadian Mathematical Society Summer Meeting, Regina, SK
 May 2019 Surfaces of Infinite Type, American Institute of Mathematics, San Jose, CA
 Dec 2018 Canadian Mathematical Society Winter Meeting, Vancouver, BC
 Apr 2018 Geometry of Teichmüller space and mapping class groups, University of Warwick, Coventry, UK
 Mar 2018 First Canadian Geometry and Topology Seminar, Fields Institute, Toronto, ON
 Dec 2017 Canadian Mathematical Society Winter Meeting, Waterloo, ON
 Sep 2017 American Mathematical Society Fall Eastern Sectional Meeting, SUNY Buffalo, NY
 May 2017 Braids in Algebra, Geometry and Topology, International Centre for Mathematical Sciences, Edinburgh, UK
 Jan 2017 Joint Mathematics Meeting, Atlanta, GA
 Dec 2016 Canadian Mathematical Society Winter Meeting, Niagara Falls, ON
 Nov 2016 Virginia Topology Conference, University of Virginia, Charlottesville, VA
 June 2016 Topology Students Workshop, Georgia Institute of Technology, Atlanta, GA
 Mar 2016 Spring Topology and Dynamics Conference, Baylor University, Waco, TX
 Dec 2015 Canadian Mathematical Society Winter Meeting, Montreal, ON
 June 2015 Summer Graduate School in Geometric Group Theory, Mathematical Sciences Research Institute, Berkeley, CA
 May 2015 Workshop on Mapping Class Groups and $\text{Out}(F_n)$, University of Austin at Texas, Austin, TX
 Dec 2014 Canadian Mathematical Society Winter Meeting, Hamilton, ON
 Jan 2014 Joint Mathematics Meeting, Baltimore, MD
 Dec 2013 Canadian Mathematical Society Winter Meeting, Ottawa, ON
 Sep 2012 Topology of Algebraic Varieties, Centre de Recherche Mathématiques, Montreal, QC
 May 2012 Geometry and Physics, University of Waterloo & Perimeter Institute, Waterloo, ON

Teaching

Awards

- 2016 **Outstanding Graduate Teaching Award**, *Pure Mathematics Department, University of Waterloo*
For outstanding teaching by a Graduate Student as both a lecturer and a teaching assistant.
- 2014 **Teaching Assistant Award**, *Pure Mathematics Department, University of Waterloo*
For outstanding teaching by a Graduate Student in a teaching assistant role.

Courses

- Spring 2023 PMATH 340 - Elementary Number Theory, University of Waterloo
- Fall 2022 MATH 235 - Linear Algebra 2 for Honours Mathematics, University of Waterloo
- Fall 2022 MATH 135 - Algebra for Honours Mathematics, University of Waterloo
- Winter 2021 MATH 141 - Calculus 2, McGill University (online)
- Fall 2020 MATH 140 - Calculus 1, McGill University (online)
- Winter 2020 MATH 133 - Linear Algebra and Geometry, McGill University
- Winter 2019 MATH 1240 - Elementary Discrete Mathematics, University of Manitoba
- Summer 2018 MATH 2090 - Linear Algebra 2, University of Manitoba
- Winter 2018 MATH 1210 - Techniques of Classical and Linear Algebra, University of Manitoba
- Fall 2017 MATH 135 - Algebra for Honours Mathematics, University of Waterloo
- Fall 2016 MATH 225 - Applied Linear Algebra 2, University of Waterloo
- Fall 2015 PMATH 336 - Introduction to Group Theory with Applications, University of Waterloo

Other

- 2012–2017 **Online Teaching Assistant**, *University of Waterloo*
- 2011–2017 **Teaching Assistant**, *University of Waterloo*
- 2009–2011 **Mathematics Tutor**, *Various residential colleges, University of Melbourne*

Non-Academic Experience

- 2013–2015 **Events Coordinator**, *Graduate House, University of Waterloo*
Events coordinator at the on campus graduate pub, the Graduate House.
- 2011 **Mentor**, *Queen's College, University of Melbourne*
Responsible for mentoring a group of 10 first year undergraduate students making the transition into University life on campus.
- 2009 **Producer - Cabaret**, *Queen's College Music and Drama Society*
Produced the Queen's College production of Cabaret, overseeing a cast and crew of over 100 people and a \$20,000 budget.

Awards and Honours

Academic

- 2016 **25th Anniversary FEZANA Endowment Scholarship for Excellence**, *Federation of Zoroastrian Associations of North America*
For academic excellence.
- 2008–2010 **6 time Wyvern Medalist**, *Queen's College, University of Melbourne*
For maintaining an average above 80% for the semester.
- 2010 **Master's Scholarship**, *Queen's College, University of Melbourne*
For outstanding academic achievement.
- 2009 **Johnstone-Need Major Scholarship**, *Queen's College, University of Melbourne*
For outstanding academic achievement.

- 2008 **Melbourne National Scholarship**, *University of Melbourne*
An undergraduate entrance scholarship for academic achievement.
- 2008 **A.L.Blakers Scholar**, *Australian National Mathematics Summer School*
For the largest social and academic contribution to the National Mathematics Summer School by a student.

Extracurricular

- 2012, 2014 **Intramural Squash Champion**, *University of Waterloo*
2-time winner of the intramural squash competition.
- 2012 **Volunteer of the Year**, *Graduate Student Association, University of Waterloo*
- 2009 **Murray Sutherland award**, *Queen's College, University of Melbourne*
For outstanding contribution to the arts at Queen's College.

Interests

- Music Folk and jazz guitar, casual pianist, shower vocalist
- Puzzles Past puzzle writer for the CMS student committee's publication *Notes from the Margin*, puzzle writer for the 2015 MUMS Puzzle Hunt, organiser of the 2016 MUMS Puzzle Hunt, and member of a team competing in international puzzle hunt competitions.
- Sport Squash, cycling, basketball, wrestling with my toddlers to get them to go to sleep.

References

Available upon request.