

Curriculum Vitae of Thomas Weighill

PERSONAL INFORMATION

Email: thomas (dot) weighill (at) gmail (dot) com

Nationality: South Africa and United Kingdom

EXPERIENCE

Postdoctoral

- Postdoctoral Fellow, Metric Geometry and Gerrymandering Group, Jonathan M. Tisch College of Civic Life, Tufts University (July 2019 –)

Teaching

- Graduate Teaching Associate at the University of Tennessee (2015 – 2019)
Math 119 College Algebra: Fall 2015
Math 125 Basic Calculus: Spring 2016, Summer 2016.
Math 251 Matrix Algebra I: Fall 2016*, Spring 2017*, Summer 2017* (online course), Fall 2017*, Spring 2018, Fall 2018*, Spring 2019* (* = primary instructor).
- Participated in Mentorship Program at the University of Tennessee (2015 – 2019)

Research

- Graduate Research Assistantship with Dr Cory Hauck, Oak Ridge National Lab (Spring 2015)

EDUCATION

Postgraduate

- PhD in Mathematics, University of Tennessee (2019)
Thesis title: *On some coarse geometric notions inspired by topology and category theory*
Advisor: Jerzy Dydak
- Master's in Mathematics (MSc) (cum laude), Stellenbosch University (2014)
Thesis title: *Bifibrational duality in non-abelian algebra and the theory of databases*
Supervisor: Zurab Janelidze

Undergraduate

- Bachelor of Engineering (Electronic and Electrical) (cum laude), Stellenbosch University (2012)

High School

- National Senior Certificate, Paarl Boys High School (2008)

SERVICE

Conference organization

- Member of organizing committee: UTK Geometric Topology Workshop, Knoxville TN, 2019.

Leadership and community involvement

- Engineering Student Council, Stellenbosch University (2011)
- Academic Affairs Council, Stellenbosch University (2011)
- Editor of Eendrag residence newspaper, the *Vires Unitatis* (2011)
- Maties Community Service marketing team (2010)

AWARDS AND SCHOLARSHIPS

- Spike Tickle STEM Fellowship (2017)
- Dorothea & Edgar Eaves Teaching Award (2016)
- Chancellor's medal, Stellenbosch University (2014)
- S2A3 medal, Stellenbosch University (2014)
- MIH Media Lab Bursary (2013–2014)
- National Research Foundation Innovation Masters Scholarship (2013–2014)
- Postgraduate Merit Bursary (2013)
- Rector's Award for Outstanding Achievement (2012)
- Mathematical Contest in Modelling: Meritorious Winner (2011)
- Square Kilometre Array Undergraduate Scholarship (2010–2011)
- First place at Pan-African Mathematics Olympiad, Benin (2008)
- Runner-up in South African Maths Olympiad (2008)

PUBLICATIONS

Papers (mathematics)

- L. Higginbotham and **T. Weighill**, *Coarse quotients by group actions and the maximal Roe algebra*, Journal of Topology and Analysis, online ready at <https://doi.org/10.1142/S1793525319500341>.
- J. Dydak and **T. Weighill**, *Monotone-light factorizations in coarse geometry*, Topology and its Applications 239, 2018, 160–180.
- J. Dydak and **T. Weighill**, *Extension theorems for large scale spaces via coarse neighbourhoods*, Mediterranean Journal of Mathematics 15, 2018, 59.
- **T. Weighill**, *Mal'tsev objects, R_1 -spaces and ultrametric spaces*, Theory and Applications of Categories 32, 2017, 1485-1500.
- **T. Weighill**, *On spaces with connected Higson coronas*, Topology and its Applications 209, 2016, 301–315.
- Z. Janelidze and **T. Weighill**, *Duality in non-abelian algebra III. Normal categories and 0-regular varieties*, Algebra Universalis 77, 2017, 1-28.
- Z. Janelidze and **T. Weighill**, *Duality in non-abelian algebra II. From Isbell bicategories to Grandis exact categories*, J. Homotopy Relat. Struct. 11, 2016, 553–570.

- Z. Janelidze and **T. Weighill**, *Duality in non-abelian algebra I. From cover relations to Grandis ex2-categories*, Theory and Applications of Categories 29.11, 2014, 315–331.

Papers (computational biology)

- B. Murrell, S. Moola, A. Mabona, **T. Weighill**, D. Sheward, S.L.K. Pond and K. Scheffler, *FUBAR: A fast, unconstrained Bayesian approximation for inferring selection*, Mol. Biol. Evol. 30(5), 2013, 1196–1205.
- B. Murrell, J.O. Wertheim, S. Moola, **T. Weighill**, K. Scheffler and S.L.K. Pond, *Detecting individual sites subject to episodic diversifying selection*, PLoS Genetics 8(7), 2012.
- B. Murrell, **T. Weighill**, J. Buys, R. Ketteringham, S. Moola, G. Benade, L. du Buisson, D. Kaliski, T. Hands and K. Scheffler, *Non-Negative Matrix Factorization for Learning Alignment-Specific Models of Protein Evolution*, PLoS ONE 6(12), 2011.

CONFERENCE PRESENTATIONS

Invited talks

- *Lifting coarse homotopies*, Special Session on Recent Advances in Coarse Geometry, AMS Spring Southeastern Sectional Meeting, Auburn AL, 2019.
- *Warped spaces and the maximal Roe algebra*, Session on Algebraic Topology and Applications, 52nd Spring Topology and Dynamical Systems Conference, Auburn AL, 2018 (joint w/ L. Higginbotham).

Contributed talks

- *Warped spaces and warped cones*, UTK Geometric Topology Workshop, Knoxville TN, 2019 (joint w/ L. Higginbotham).
- *Three extension theorems: topological, uniform and large scale*, General Session on Topology, Joint Mathematics Meetings, Baltimore MD, 2019 (joint w/ J. Dydak).
- *Montone-light factorizations in coarse geometry*, Workshop in Geometric Topology, Provo UT, 2017 (joint w/ J. Dydak).
- *Extension theorems for large scale spaces via neighbourhood operators*, Summer Conference on Topology and its Applications, Dayton OH, 2017 (joint w/ J. Dydak).
- *On spaces with connected Higson coronas*, Workshop in Geometric Topology, Colorado Springs CO, 2016.
- *On spaces with connected Higson coronas*, Graduate Student Topology and Geometry Conference, Bloomington IN, 2016.
- *A characterization of $R1$ -spaces via a Mal'tsev condition*, Young Topologists Meeting, Lausanne, 2015.
- *On a characterisation of codomain functors arising from classes of morphisms*, South African Mathematical Society (SAMS) Annual Congress, Johannesburg, 2014.
- *A self-dual approach to algebra using Grothendieck bifibrations*, Fibrations in Computation Workshop, Glasgow, 2014 (joint w/ Z. Janelidze).
- *A characterisation of $R1$ -spaces via approximate Mal'tsev operations*, Workshop on Categorical Methods in Algebra and Topology, Coimbra, 2014.
- *Isomorphism theorems in groups via Grothendieck bifibrations*, South African Mathematical Society (SAMS) Annual Congress, Pietermaritzburg, 2013 (joint w/ Z. Janelidze).

- *On Grothendieck bifibrations arising from classes of monomorphisms*, Category Theory International Conference, Macquarie University, Sydney, 2013 (joint w/ Z. Janelidze).

Posters

- *Warped spaces and the maximal Roe algebra*, Workshop on Large Scale Geometry and Applications, Fields Institute, Toronto, Canada, 2018 (invited, joint w/ L. Higginbotham).
- *On a characterisation of codomain functors arising from classes of morphisms*, Category Theory International Conference, Cambridge, 2014.
- *Dimensionality reduction for learning alignment-specific amino acid substitution models*, Society for Molecular Biology and Evolution (SMBE) Annual Meeting 2011, Kyoto. Poster was awarded best undergraduate poster (joint w/ B. Murrell, J. Buys, R. Ketteringham, S. Moola, G. Benade, L. du Buisson, D. Kaliski, T. Hands and K. Scheffler).

RESEARCH VISITS

- Invited by Professor Marino Gran to visit the School of Mathematics at Université catholique de Louvain, 15–20 June 2014.