Emily Roff

Curriculum Vitae

School of Mathematics University of Edinburgh James Clerk Maxwell Building Peter Guthrie Tait Road Edinburgh, EH9 3FD ${\it emily.roff@ed.ac.uk} \\ www.maths.ed.ac.uk/{\sim} emilyroff/$

Academic employment _____

Flora Philip Research Fellow, University of Edinburgh (on leave in 2023–2024)	2023 - 2028
JSPS Postdoctoral Research Fellow, Osaka University	2023 - 2024
Maxwell Institute Postdoctoral Research Fellow, University of Edinburgh	2022 - 2023

Education _____

PhD in Mathematics, University of Edinburgh	2018-2022
MASt in Pure Mathematics, University of Cambridge	2017 - 2018
BSc (Hons.) in Mathematics, King's College London	2015 - 2017
Modules in Mathematics (120 credits at SCQF levels 7–9), Open University	2012 - 2015
MA (Hons.) in Scottish Ethnology, University of Edinburgh	2005 - 2009

Publications and preprints _

Authors are listed alphabetically. Student co-authors are marked with an asterisk.

- [8] Katsumasa^{*}, Roff and Yoshinaga. Is magnitude 'generically continuous' for finite metric spaces? Under review. Preprint: arXiv:2501.08745, 2025
- [7] Hepworth and Roff. Bigraded path homology and the magnitude-path spectral sequence. Under review. Preprint: arXiv:2404.06689, 2024
- [6] Roff and Yoshinaga. The small-scale limit of magnitude and the one-point property. Bulletin of the London Mathematical Society DOI: 10.1112/blms.70064, 2025
- [5] Hepworth and Roff. The reachability homology of a directed graph. International Mathematics Research Notices 2025(3):1–18, 2025
- [4] Roff. Iterated magnitude homology. Advances in Mathematics 468(2025):110210, 2025
- [3] Roff. Magnitude, homology, and the Whitney twist. Homology, Homotopy and Applications 26(1):105-130, 2024
- [2] Roff. The size and shape of things: Magnitude, diversity, homology.PhD thesis, Edinburgh, 2022. Contains elements of [1], [3] and [4], plus an unpublished final chapter.
- [1] Leinster and Roff. The maximum entropy of a metric space. The Quarterly Journal of Mathematics 72(4):1271–1309, 2021

Research visits _____

School of Mathematics, University of Sheffield (invited by Sarah Whitehouse)	Sep 2025
Isaac Newton Institute, Cambridge (programme on Equivariant Homotopy Theory in Context)	Feb 2025
Mathematical Institute, University of Göttingen (invited by Federico Vigolo)	Nov 2024
Beijing Institute for Mathematical Sciences and Applications (invited by Sergei O. Ivanov)	Apr 2024
Department of Mathematics, Fukuoka University (invited by Yasuhiko Asao)	Feb 2024
Mathematical Institute, University of Oxford (invited by Heather Harrington)	May 2023

Invited talks _____

'Homotopy by degrees and the magnitude-path spectral sequence'. Topology Seminar, Göttingen	2024
'Homotopy by degrees and the magnitude-path spectral sequence'. Topology Seminar, EPFL	2024
'Bigraded path homology and the magnitude-path spectral sequence'. AATRN Networks Seminar	2024
'Homotopy by degrees and the magnitude-path spectral sequence'. Topology Seminar, Sheffield	2024
'Bigraded path homology and the magnitude-path spectral sequence'. Special Session on Discrete and Combinatorial Homotopy, AMS–UMI Joint Meeting, Palermo	2024
'Entropy, diversity and magnitude: a survey, with questions'. Dynamical Systems Seminar, Kyoto	2024
'Bigraded path homology and the magnitude-path spectral sequence'. Topology Seminar, BIMSA	2024
'What is the shape of a network?' SIAM Minisymposium on Magnitude, TU Eindhoven	2023
(Two untitled talks.) Beyond Finite Sets: Homotopy Theory and Combinatorics Workshop, Copenhagen	2023
'Magnitude homology of enriched groups'. Topology Seminar, Aberdeen	2023
'What are higher-order roles in social systems?'. 10th Symposium on Compositional Structures (SYCO10), Edinburgh	2022
'Magnitude homology, normed groups and holes in the plane'. Algebra, Geometry & Combinatorics Colloquium, TU Dresden	2022
'Magnitude homology and iterated enrichment'. PostGrad Forum, Lancaster	2021
'Magnitude homology of semidirect products and spheres'. Bicategories Seminar, Sheffield	2021
'Maximum entropy, uniform measure'. ML@CL Machine Learning Seminar, Cambridge	2020
'Magnitude homology, from scratch'. Pure PostGrad Seminar, Southampton	2020
'Diversity and magnitude'. LMS Applied Algebra and Geometry Research Network, Oxford	2019
'The magnitude and diversity of a metric space'. TopApp Workshop, IST Austria	2019

Contributed talks _____

'The bigraded path homology of a directed graph' (poster). Spires 2024, Oxford	2024
'Reachability homology and the magnitude-path spectral sequence'. CT2024, Santiago de Compostela	2024
'Iterated magnitude homology'. Magnitude 2023, Osaka	2023
'Magnitude homology in Euclidean space'. PSSL 106, Brno	2022
'Magnitude homology and iterated enrichment'. CT20 \rightarrow 21, Genova	2021
'Magnitude homology and iterated enrichment'. Categories & Companions, Macquarie	2021
'The maximum diversity of a compact space'. Magnitude 2019, ICMS, Edinburgh	2019

Local seminar talks _____

'Homotopy by degrees and the magnitude-path spectral sequence'.	
The Maxwell Institute Structure and Symmetry Day, Edinburgh	2025
'Reachability homology and the magnitude-path spectral sequence'. Topology Seminar, Osaka	2023
'Magnitude, diversity, homology: a survey, with questions'. Analysis Seminar, Edinburgh	2023
'Return of the alley cats'. The Categorical Late Lunch, Edinburgh	2021
'What is a hole in a locally metric category?'. The Categorical Late Lunch, Edinburgh	2021
'Hochschild homology for enriched categories'. Hodge Club, Edinburgh	2019
'The magnitude of an enriched category'. GEARS Seminar, Edinburgh	2019
'Diversity: developments in the biology of mathematics'. Hodge Club, Edinburgh	2019
'Building complexes from point clouds'. Persistent Homology Working Seminar, Edinburgh	2019
'Commutative monads'. Part III Seminar, Cambridge	2018

Supervision and mentorship _____

Project supervisor in the School of Mathematics, University of Edinburgh	
- 'Homotopy and cohesion in toposes of graphs'	2024 - 2025
- 'Quantifying political diversity' 20	022-2023, 2024-2025
- 'Categorified linear algebra and the Legendre–Fenchel transform'	2020
Teaching mentor for the EdTA programme, University of Edinburgh Advised mathematics PhD students preparing for Associate Fellowship of the HEA.	2020-2022
Other teaching	
Nominee in Edinburgh's student-led Teaching Awards	
– As Teacher of the Year	2023
– As Student Tutor of the Year	2022
Lecturer in the School of Mathematics, University of Edinburgh	
 Honours Algebra Part of the three-person teaching team for this core course taken by Year 3 mathem 	2023 atics students.
 Introduction to Linear Algebra Part of the four-person teaching team for this course taken by 800 Year 1 mathematic natural science and engineering students. 	2022 cs, computer science,
Graduate teaching assistant in the School of Economics, University of Edinburgh Created three video lectures for Advanced Mathematical Economics (Year 4 & MSc) Tutor for Advanced Mathematical Economics (Year 4 & MSc)	2021 2019, 2020, 2021
Graduate teaching assistant in the School of Mathematics, University of Edinburgh Tutor and marker for Honours Analysis Skills (Years 3–4) Tutor and marker for Honours Algebra (Years 3–4) Tutor and marker for Accelerated Proofs and Problem Solving (Year 2)	$\begin{array}{c} 2019,\ 2021\\ 2019,\ 2020\\ 2019,\ 2020 \end{array}$
Academic service	
Co-organizer of the AGATE Seminar , Edinburgh A pplied G eometry, A lgebra and T opology in E dinburgh: a weekly seminar in the Scho	2024–2025 ool of Mathematics.
Programme committee member for the International Conference on Applied Cate	egory Theory.
- ACT2024 , University of Oxford	2024
- ACT2023, University of Maryland	2023
– ACT2022 , University of Strathclyde	2022
Co-organizer of Magnitude 2023 , Osaka University A week-long, 40-person workshop on magnitude and magnitude homology, supported by	2023 y JSPS.
Co-organizer of The Categorical Late Lunch , Edinburgh A fortnightly category theory seminar with a mixed crowd of mathematicians and comp	2020–2023 puter scientists.
Assistant (one of three) at the AMS MRC on Applied Category Theory A collaborative research programme coordinated by the American Mathematical Society	2022 y.
Initiator and local organizer of Topics in Category Theory: A Spring School, ICI	MS, Edinburgh 2020
A graduate conference involving 75 junior researchers in category theory and neighbour participants travelling from Brazil, Japan, the USA, across Europe and the UK.	ring disciplines, with
Local helper at CT2019 , ICMS, Edinburgh	2019

The annual International Conference on Category Theory.

Grants obtained _

Scottish Mathematical Sciences Training Centre, Knowledge Exchange Grant $(\pounds 2,401)$	2021
London Mathematical Society, Postgraduate Research Conference Grant (£2,551)	2019
Glasgow Mathematical Journal Trust , Learning and Research Support Fund $(\pounds 3,489)$	2019
Edinburgh Mathematical Society, Research Support Fund (£1,390)	2019

Equality, diversity and inclusion _____

ED&I representative on the Honours Curriculum Review Committee, Edinburgh	2024 - 2025
Colloquium speaker for the Count Me In research experience programme, Edinburgh	2024
Moderator of ED&I panel at the first CATNIP meeting, Edinburgh	2023
A discussion of ways to encourage more women to apply for PhDs in pure mathematics and computer scie	
Postdoc representative on the ED&I Committee, School of Mathematics, Edinburgh	2022 - 2023

Public engagement and outreach _

Instructor for the LIFE project, Performing Arts Forum, France

A series of week-long workshops introducing central themes of modern mathematics and physics to adults without a university education in science. Led by Gabriel Catren (Université Paris–Diderot) and supported by the Laboratoire SPHere—Sciences, Philosophie, Histoire.

- Deeply Organized Chaos, introducing non-linear dynamics and chaos theory.
 2022
 Gave a class on difference and differential equations and a workshop exploring fractal dimension.
- Mobilis in Mobili, introducing the history of the relationship between physics and geometry. 2019
 Gave a class on Euclidean and Cartesian geometry, and a workshop in which participants were guided collaboratively to invent Gaussian curvature and discover the *Theorema Egregium*.
- Categories for the Hard-Working Non-Mathematician, introducing key concepts of category theory. 2018 Gave three classes: on sets, equivalence relations and groupoids; on categories and functors; and on algebraic methods in topology.

Invited participant at the Institute of Physical Sociality

An interdisciplinary research group interested in mathematics and physics, ethics, gender and race, initiated by Edinburgh-based arts company Arika. For a body of work related to this project, Arika received one of ten Turner Bursaries awarded in 2020 in place of the Turner Prize.

– Online working group led by Denise Ferreira da Silva and Susanne Winterling	2021 - 2022
 Week-long meeting at Skowhegan Gallery and New York University led by Karen Barad, Gabriel Catren, Fred Moten and Fernando Zalamea 	2018

Project leader for Difficult Conversations

A knowledge exchange project hosted by DeMoS (Paris) and Arika (Edinburgh), and funded by the SMSTC.

2021

Seminar guest at Robert Schumann Hochschule, Düsseldorf

Two seminar series, led by Julian Rohrhuber, for masters students of Music Informatics and Media Theory with an interest in abstract algebra and category theory. At each seminar I led two three-hour discussions around universal properties, diagrams and limits.

_	Leap and Limit seminar	2019
_	Form and Formalism seminar	2018

Memberships and accreditations

Member of the American Mathematical Society	Since 2022
Associate Fellow of the HEA (Higher Education Academy/Advance HE)	Since 2020
Member of the Isaac Newton Institute	Since 2019
Member of the Edinburgh Mathematical Society	Since 2018
Member of the London Mathematical Society	Since 2017

Other professional experience _

Welfare rights adviser, Glasgow and London2011–2016At Child Poverty Action Group (2015–'16), Drumchapel Money Advice Centre ('13–'15), WestGAP ('11–'13).2006–2013Arts producer, Edinburgh and Glasgow2006–2013At Arika (2012–'13) and Tracer Trails ('06–'12).2006–2013