Emily Roff Curriculum Vitae

School of Mathematics
University of Edinburgh
James Clerk Maxwell Building
Peter Guthrie Tait Road
Edinburgh, EH9 3FD

emily.roff@ed.ac.uk
www.maths.ed.ac.uk/∼emilyroff/

Academic employment

Flora Philip Research Fellow, University of Edinburgh	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 (mathematics)

Authors are listed alphabetically, except in cases marked by †. Student co-authors are marked by ∗.

[9] Motamed*, Otter and Roff. Coalgebraic analysis of social systems.
Preprint: arXiv:2602.23211, 2026

[8] Katsumasa*, Roff and Yoshinaga. Is magnitude 'generically continuous' for finite metric spaces?
Preprint: arXiv:2501.08745, 2025

[7] Hepworth and Roff. Bigraded path homology and the magnitude-path spectral sequence.
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 57(6):1841–1855, 2025 (and arXiv:2312.14497)

[5] Hepworth and Roff. The reachability homology of a directed graph.
International Mathematics Research Notices (IMRN) 2025(3):1–18, 2025 (and arXiv:2312.01378)

[4] Roff. Iterated magnitude homology.
Advances in Mathematics 468(2025):110210, 2025 (and arXiv:2309.00577)

[3] Roff. Magnitude, homology, and the Whitney twist.
Homology, Homotopy and Applications 26(1):105–130, 2024 (and arXiv:2211.02520)

[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 Contains elements of [1], [3] and [4], plus an unpublished final chapter.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 (and arXiv:1908.11184)

Publications and preprints (mathematics education)

[1] Kinnear, Iannone and Roff.† Course choices in undergraduate mathematics: A Situated Expectancy–Value analysis. Submitted, 2025.

Research visits

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

Invited talks

'Magnitude: a survey, with questions'. Analysis Seminar, Birmingham	2025
'Quantitative discrete homotopy theory'. Geometry and Topology Seminar, Glasgow	2025
'What is the shape of a network?' Mathematical Colloquium, Queen's University Belfast	2025
'Quantitative discrete homotopy theory'. Topology Intercity Seminar, Utrecht/Nijmegen/Amsterdam	2025
'Quantitative discrete homotopy theory'. Scottish Topology Seminar, Aberdeen	2025
'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

[Title TBC]. Homotopy and Homotopy in the World of Graphs, EPFL	*2026*
'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→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

'Coalgebraic analysis of social systems'. Category Theory Seminar, Edinburgh	2026
'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

PhD supervision in the School of Mathematics, University of Edinburgh
– Maia Woolf (second supervisor)   2025–present

BSc and MMath project supervision in the School of Mathematics, University of Edinburgh
– 'Homotopy and cohesion in toposes of graphs'   2024–2025
– 'Quantifying political diversity'   2022–2023, 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

Honours Curriculum Review Committee member (ED&I representative), Edinburgh   2024–2026

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   2023
  Part of the three-person teaching team for this core course taken by Year 3 mathematics students.
– Introduction to Linear Algebra   2022
  Part of the four-person teaching team for this course taken by 800 Year 1 mathematics, computer science, natural science and engineering students.

Graduate teaching assistant in the School of Economics, University of Edinburgh
Created three video lectures for Advanced Mathematical Economics (Year 4 & MSc)   2021
Tutor for Advanced Mathematical Economics (Year 4 & MSc)   2019, 2020, 2021

Graduate teaching assistant in the School of Mathematics, University of Edinburgh
Tutor and marker for Honours Analysis Skills (Years 3–4)   2019, 2021
Tutor and marker for Honours Algebra (Years 3–4)   2019, 2020
Tutor and marker for Accelerated Proofs and Problem Solving (Year 2)   2019, 2020

Academic service

Co-organizer of the **Scottish Topology Seminar**   2025–present
A joint seminar between the universities of Aberdeen, Edinburgh, Glasgow and Heriot-Watt.

Co-organizer of the **AGATE Seminar**, Edinburgh   2024–2025
Applied **G**eometry, **A**lgebra and **T**opology in **E**dinburgh: a weekly seminar in the School of Mathematics.

Programme committee member for the **International Conference on Applied Category Theory**.
– **ACT2024**, University of Oxford   2024
– **ACT2023**, University of Maryland   2023
– **ACT2022**, University of Strathclyde   2022

Co-organizer of **Magnitude 2023**, Osaka University   2023
A week-long, 40-person workshop on magnitude and magnitude homology, supported by JSPS.

Co-organizer of the **Category Theory Seminar**, Edinburgh   2020–2023
A fortnightly category theory seminar with a mixed crowd of mathematicians and computer scientists.

Assistant (one of three) at the **AMS MRC on Applied Category Theory**   2022
A collaborative research programme coordinated by the American Mathematical Society.

Initiator and local organizer of **Topics in Category Theory: A Spring School**, ICMS, Edinburgh 2020
A graduate conference involving 75 junior researchers in category theory and neighbouring disciplines, with participants travelling from Brazil, Japan, the USA, across Europe and the UK.

Local helper at **CT2019**, ICMS, Edinburgh   2019
The annual International Conference on Category Theory.

Grants obtained

Scottish Mathematical Sciences Training Centre, Knowledge Exchange Grant (£2,401)   2021

London Mathematical Society, Postgraduate Research Conference Grant (£2,551)   2019

Glasgow Mathematical Journal Trust, Learning and Research Support Fund (£3,489)   2019

Edinburgh Mathematical Society, Research Support Fund (£1,390)   2019

Equality, diversity and inclusion

Colloquium speaker for the Count Me In research experience programme, Edinburgh   2024

Moderator of ED&I panel at the first CATNIP meeting, Edinburgh   2023

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.

- *The Infinite, the Infinitesimal, and the Imaginary*, introducing differential and integral calculus.   2025
- *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   2018
  led by Karen Barad, Gabriel Catren, Fred Moten and Fernando Zalamea

Project leader for Difficult Conversations   2021
A knowledge exchange project hosted by DeMoS (Paris) and Arika (Edinburgh), and funded by the SMSTC.

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 London   2011–2016
At Child Poverty Action Group (2015–'16), Drumchapel Money Advice Centre ('13–'15), WestGAP ('11–'13).
Arts producer, Edinburgh and Glasgow   2006–2013
At Arika (2012–'13) and Tracer Trails ('06–'12).